



A Data-Story Library for New Zealand First Year Business Students

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Executive Summary

This report describes the genesis, implementation and outcomes of a project to collect datasets related to New Zealand business activity for use in teaching introductory statistics and quantitative methods to undergraduate Business students, and to place them in an online data-story library for open access. The desirability of providing such a resource is discussed in relation to the Statistics Education literature, and also to the particular needs of a redesigned Business Statistics paper offered at Massey University. Details of usage of these datasets in this paper is described, together with an analysis of student participation and performance before and after the introduction of the datasets, and the results of a class survey used to gauge student's perceptions of these datasets in relation to their expectations of learning and outcomes in a Business Statistics paper. A summary of the datasets collected and an example of a workshop activity using some of this data are included as Appendices.

Introduction

Most undergraduate degree programmes in Business, Management and Commerce have a compulsory requirement in Quantitative Methods such as Business Mathematics and/or Business Statistics. For example the Association to Advance Collegiate Schools of Business (AACSB) accreditation process requires that undergraduate business majors should possess a basic understanding of mathematics and statistics, and all eight New Zealand universities have a compulsory paper (or its equivalent) in Quantitative Methods or Business Statistics in their core Business/Management/Commerce degree. In most cases this topic is covered in the first year of degree study.

Many students entering these programmes may have not studied much Mathematics or Statistics at high school level. For example a survey of all students enrolled in the Statistics for Business paper offered at Massey University's Auckland campus in Summer 2011/12 reported that 36% of students rated their background knowledge of Statistics on entry as poor – 18% had not studied mathematics beyond Year 11 in New Zealand and 19% had studied no Statistics at high school level overseas. These students are typically over-represented in self-help tutorial or clinic classes.

Even amongst students who have recent background study in these areas, however, there may be a lack of understanding or appreciation of the importance of statistical thinking and statistical literacy in business and decision making. McAlevey and Stent (1999) reported that students who had completed an introductory course believed that the first year was too early in their Business course to appreciate the relevance of Statistics. Coleman and Conrad (2007) found that students in their study were significantly less likely to rate a Statistics or research methods course as helpful to their career compared to non Statistics based courses.

One way to assist students in perceiving relevance is to provide examples, exercises, questions and case studies based on real business data. Cryer (2002) reviewed the principal conclusions of 17 annual U.S. Conferences called Making Statistics More Effective in Schools and Business, which included recommendations to use real data (preferably hands-on), and statements that students are more effectively motivated by seeing statistics at work in solving real problems. John and Johnson (2002) state that “...students are most effectively motivated by seeing statistics at work in real applications, problems, cases, and projects.”

Background

The paper *115.101 Statistics for Business* has been a compulsory paper in the Bachelor of Business Studies at Massey University since 2009 (and for many years before that as *161.110 Introductory Business Statistics*), and has been delivered internally at all three of Massey's campuses together with distance mode delivery. For many years a core textbook in Business Statistics had been used to support the teaching materials in this paper. However student complaints about various aspects of the textbook(s) used were identified as an ongoing source of dissatisfaction with the paper. These included

1. Lack of relevance to business studies, especially New Zealand business;

2. Difficulty in understanding the core concepts and their presentation, including layout;
3. Problems with installing software, and proprietary use issues – for example students could not install proprietary software on more than one computer, or continue to use software after a set period of time;
4. Distance students had problems in connecting to and downloading electronic material from publishers' websites.

During this time period a suite of interactive ebooks in Statistics called CAST (Computer-Assisted Statistics Textbooks) were developed by Doug Stirling at Massey University (see e.g. Stirling (2001)). The primary purpose of CAST was to overcome limitations inherent in static paper-based introductory statistics textbooks by creating a package of e-books that used dynamic and interactive diagrams to explain concepts together with interactive computer-based exercises. The CAST framework allowed a customised e-book to be generated with topics and ordering specific to the Introductory Business Statistics paper taught at Massey University. See Edwards et al (2011) for a discussion of CAST and its usage in this paper.

Having decided to switch from a traditional textbook to a customised version of CAST, it was then necessary to identify and collect a range of business-related datasets that could be used as examples and exercises, as the introductory course versions of CAST all shared a common set of examples and exercises spanning a range of disciplines. Given the student feedback described above, it was decided that these datasets should be focused on activities and settings relating to New Zealand business activity.

The first places to be searched were the online [Data and Story Libraries](#) (DASL for short). A Data and Story Library houses datasets (usually in text format) together with relevant information about the dataset: a description of the data including the variables in the data set, the context in which the data was collected, and a listing of statistical methods that might be used to summarise or analyse the data (the story). Webpages and links allow the user to list datasets by subject or by statistical application. The original Data and Story Library was developed at Cornell University and is currently hosted at Carnegie-Mellon University as part of the StatLib project (see e.g. Witmer (1996)), and the Australasian version OzDASL is hosted as part of the StatSci project courtesy of the Walter and Eliza Hall Institute of Medical Research (Smyth (2011)). While both sites have some business or business-related datasets, there were only one or two datasets that were both a) sufficiently relevant to New Zealand business activity and b) up to date to be considered for inclusion.

It was this unavailability of New Zealand business-related data in a single searchable data archive that was the driver for the current project. Furthermore, discussions with colleagues at other tertiary institutions suggested that an openly accessible archive would be a valuable resource for teaching and learning.

The first stage of data collection focused on webpages of government departments (e.g. Statistics NZ) and private organisations such as banks and insurance companies. The second stage (still in progress) is focused on scholarly articles and publications in Business, Economics and Management journals. Much of the data is longitudinal (i.e. time series data) which requires updating on an ongoing basis. No specific criteria were used for selecting datasets, other than the requirements

that: a) they related to New Zealand business activity, and; b) that they were able to be used to illustrate methods commonly taught in an introductory Business Statistics course. Note that this criteria allowed the inclusion of international data in which New Zealand activity is compared to similar overseas activities – for example the datasets sourced from the OECD allow comparisons to be made with New Zealand and other countries using a range of economic criteria.

Appendix 1 lists the datasets that have been collected to date (August 2012).

Dataset Usage

The first offering which incorporated these datasets was the 2011-2012 Summer School offering (110 students enrolled). In this offering datasets were employed only in the workshops as follows: short term visitor arrivals to New Zealand data was used extensively in both workshops 1 and 2, Palmerston North supermarket shopping pattern data was used in a small part of workshop 3, and New Zealand house price data was used extensively in workshop 4. No formal evaluation of this usage was carried out.

More extensive use of these datasets was made in the Semester 1 2012 offering (352 students enrolled). The following datasets were used in lectures:

1. *NZDrates.txt* (monthly exchange rates for NZ dollars into US dollars and Australian dollars) was used to illustrate the use of frequency polygons (in contrast to histograms) to make comparisons of the distributions of two datasets;
2. *OECDgdpANDedu.txt* (GDP, CPI, gross enrolment rate at tertiary level, and public spending on education statistics for 23 OECD countries in 2000 and 2008) was used to demonstrate how simple linear regression can be used to predict NZ tertiary enrolment rates in 2008 based on 2000 enrolment rates;
3. *catering.txt* (costs and numbers of different food items ordered from a local caterer) was used to show how multiple linear regression can be used to predict the cost of filling a catering order based on the number of major food items ordered;
4. *fishprices.txt* (average price/kg of different fish species in New Zealand) was used to illustrate how a time series plot is constructed, and also to show how aggregate price indices are calculated;
5. *realestate.txt* (which contains quarterly values of the New Zealand Consumers' Price Index) was used to demonstrate the effect of an irregular or random occurrence (namely the introduction of GST) on a time series;
6. *visitortotal.txt* (counts of monthly total of visitor arrivals to New Zealand) was used to demonstrate how moving averages can be used to smooth out seasonality from a time series and identify the underlying trend.

The following datasets were used in workshops:

1. *savingsurvey.txt* (data from the 2001 Household Savings Survey) was used to enable students to construct a sampling distribution for the mean and to see the Central Limit theorem at work. The income data is skewed to the right, but each student gathered his or her own simple random sample of incomes and then plotted the resulting class sample means using a stem-and-leaf plot, which showed the properties of the sampling distribution of the mean;
2. The same dataset was used in another workshop to illustrate the frequentist properties of a confidence interval. Each student constructed a 95% confidence interval based on his or her own sample mean and plotted the resulting interval on the board. The value of the true mean was then revealed and the proportion of intervals containing the true value was shown to be close to 95%.
3. *realestate.txt* (floor area of new buildings, median housing prices, consumer price index (CPI), floating mortgage rates, and permanent and long-term arrivals and departures statistics recorded as quarterly time series) was used for students to explore both simple and multiple least squares regression models. Students were given a scatterplot and computer output of a simple linear regression model of median New Zealand house prices versus time, and asked to comment on the model fit and how it might be improved. Students were also given a multiple regression model which used Auckland house prices as a second explanatory variable and were then asked to compare the two models.

Finally, the datasets *housing1.txt* and *realestate.txt* were incorporated into an updated version of the CAST ebook, the former to illustrate the use of contingency tables for summarising categorical data and the latter to demonstrate linear trend in a time series and how linear regression can be used to model it.

Appendix 2 shows a typical workshop activity which employed some of the data.

Student Performance

Student performance data was compared across the two offerings Semester 1 2011 and Semester 1 2012, as the two offerings were similar in most respects except in the use of New Zealand Business data in 2012. As these are longitudinal studies caution is advised in attributing any observed differences as being solely due to the use of New Zealand Business data.

	2011	2012	One-sided p
Workshop attendance rate	62%	66%	0.0139(*)
Mean workshops/student (4)	2.49	2.65	0.0930(.)
Assignment submission rate	88%	90%	0.0720(.)
Mean assignments/student (3)	2.65	2.70	0.2229()
Exam attendance	88%	94%	0.0088(**)
Pass rate	72%	75%	0.0265(*)

Despite the caution above, it was pleasing to note that all indicators of participation and involvement in the paper offering improved in 2012, although not all improvements were statistically significant. Attendance at both the workshops and the final examination improved significantly, and assignment submission increased slightly (weakly significant). The mean number of workshops attended per student and the mean number of assignments submitted per student increased slightly (weakly significant for workshops, not significant for assignments).

The overall pass rate showed a significant improvement.

Student Survey Results

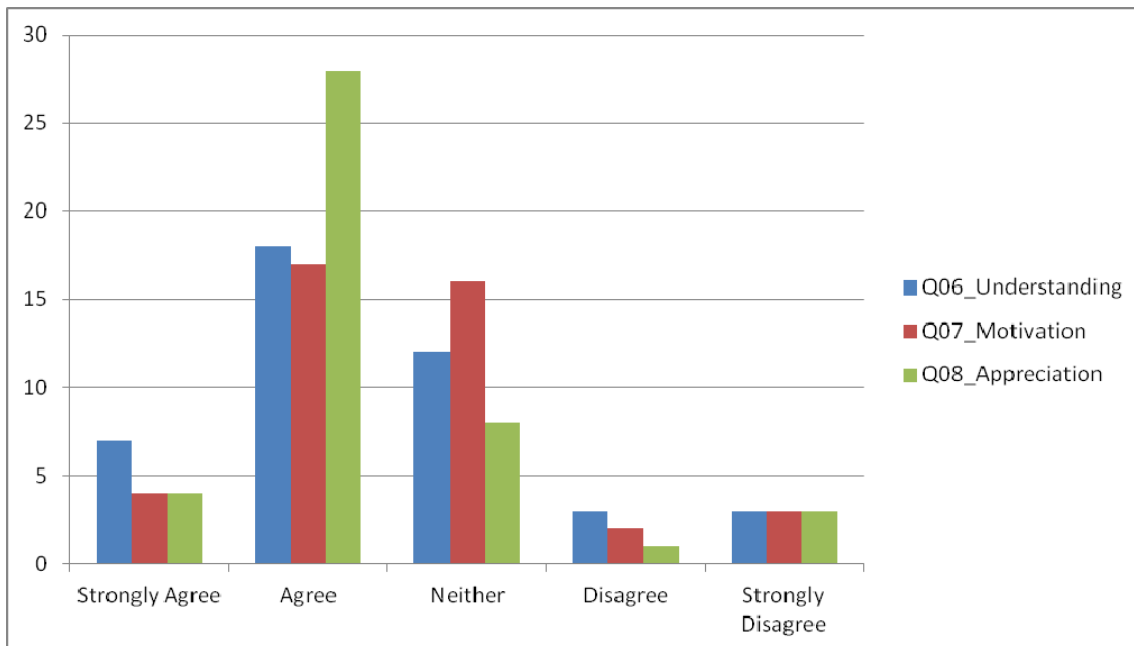
Towards the end of Semester 1 2012 an online survey of student attitudes and opinions towards the use of NZ Business-related datasets was conducted. Emails were sent to all students in the class advising them of the survey and including a link to the online survey page, and reminders were announced in class. A total of 46 responses were received.

The graph below shows responses to three questions in which students were asked how the use of NZ Business related datasets affected three attitudinal components towards Statistics, namely understanding, motivation and appreciation. These questions were:

*Question 6: Having New Zealand Business-related datasets in the lectures and workshops increased my **understanding** of the methods and techniques used in this paper.*

*Question 7: Having New Zealand Business-related datasets in the lectures and workshops increased my **motivation** to understand the concepts and methods covered in this paper.*

*Question 8: Having New Zealand Business-related datasets in the lectures and workshops increased my **appreciation** for the usefulness of Statistics in Business Studies.*



Most students either agreed or strongly agreed that the use of these datasets had increased all three components, and in particular a large number (32 out of 44) of responses indicated that their appreciation for Statistics in Business Studies had increased. In every case at least half the respondents agreed with the relevant statement (58%, 50% and 73% respectively). Responses to these questions were moderately correlated (Spearman r values were 0.58 for understanding and motivation, 0.66 for understanding and appreciation, and 0.69 for motivation and appreciation). Responses to all three questions were not associated with gender, age, or previous Statistics background (all chi-squared tests of association were not significant at $p = 0.10$).

64% of all students surveyed agreed that including more New Zealand related datasets in the course would be worthwhile.

Student recall of New Zealand datasets was found to be highest in the workshop environment (average 70% versus 47% for lectures), suggesting that hands-on use of such data in a group activity environment provides a more vivid impression.

Conclusions

Based on the evidence received to date, we conclude that the introduction of datasets related to New Zealand Business activity has been associated with a positive effect on the learning experience of students in paper 115.101. Student participation indicators have improved since the datasets were introduced and student survey results suggest that students' attitudes towards the use of Statistics in Business Studies have increased in a positive fashion. More needs to be done in terms of incorporating datasets into CAST and into assignments, and more cross-sectional datasets need to be collected. We are mindful of the needs of students (in particular international students) to also be exposed to datasets relating to international activity, and in the future we will work towards obtaining datasets which (a) relate New Zealand to other countries such as China, and (b) show

important aspects of international business activity as it relates to New Zealand and its place in the global marketplace.

The current version of the data and story library may be found at bizstats.massey.ac.nz.

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Appendix 1

Summary of datasets collected to date

Filename	Source	Description
aptrent.txt	Table 3 in the article "Total Returns Analysis for the Auckland and Wellington Apartment Markets in New Zealand" by Song Shi, originally published in Australian and New Zealand Property Journal, March 2007, Vol. 1/No.1.	Total returns analysis for the Auckland and Wellington apartment markets
census2006.txt	http://www.stats.govt.nz/tools_and_services/tools/TableBuilder/table-by-subject.aspx	The highest qualification achieved statistics (classified by sex) collected in the 2006 NZ census.
christchurch.txt	Table 2 in the article "Residential Property market performance in a declining market: Christchurch case study" by Chris Eves, originally published in Australian and New Zealand Property Journal, December 2009, Vol. 2/No.4.	Christchurch residential property market case study: 2006 - 2009
divorce.txt	http://www.stats.govt.nz/infoshare	Divorce rate of the total population in New Zealand.
ecolabel.txt	"ECO CRED CAN BOOST SALES" published in NZ Marketing November-December 2009.	According to 09/2009 ShapeNZ online survey of 2397 New Zealanders, eco labels could make a third of people more likely to buy a product
energy.txt	http://www.stats.govt.nz/infoshare	Energy price indexes in New Zealand over the period of 1990 to 2010
entrepreneur1.txt	University Students Perceptions on Entrepreneurship: Commerce Students Attitudes at Lincoln University by Jamal Roudaki, Journal of Accounting – Business & Management vol. 16 no. 2 (2009) 36 – 53	University students' perceptions on entrepreneurship
entrepreneur2.txt	University Students Perceptions on Entrepreneurship: Commerce Students Attitudes at Lincoln University by Jamal Roudaki, Journal of Accounting – Business & Management vol. 16 no. 2 (2009) 36 – 54	University students' perceptions on entrepreneurship

eshop1.txt	“MEET THE E-LOCALS”, published in NZ Marketing May-June 2010 and the data source was originally from Nielsen AdRelevance 2009	Online retail: unprompted retail website brand awareness
eshop2.txt	“MEET THE E-LOCALS”, published in NZ Marketing May-June 2010 and the data source was originally from Nielsen AdRelevance 2009	Online retail: unprompted retail website brand awareness
farmland.txt	“A comparison of farmland returns in Australia, Canada, New Zealand and United States” by Chris Eves, originally published in Australian and New Zealand Property Journal, September 2008, Vol. 1/No.7.	A comparison of farmland returns in four countries
houseprice.txt	https://www.reinz.co.nz/reinz/public/housing-price-index	REINZ monthly residential property sales
housing1.txt	http://www.nzbcscd.org.nz/housing/	2008 New Zealand housing survey
housing2.txt	http://www.nzbcscd.org.nz/housing/	2009 New Zealand housing survey
housing3.txt	http://www.nzbcscd.org.nz/housing/	2010 New Zealand housing survey
incomebyage.txt	New Zealand Income Survey: June 2008 quarter (Revised 17 October 2008)	Average and median weekly income from different sources for all people classified by age groups.
incomebyquali.txt	New Zealand Income Survey: June 2008 quarter (Revised 17 October 2008)	Average and median weekly income from different sources for all people classified by the highest qualification achieved.
incomebysex.txt	New Zealand Income Survey: June 2008 quarter (Revised 17 October 2008)	Average and median weekly income from different sources for all people classified by male and female populations.
migration.txt	http://www.stats.govt.nz/tools_and_services/tools/TableBuilder/table-by-subject.aspx	Number of people of permanent and long-term arrivals (into New Zealand) and

		departures (from New Zealand).
NZDrates.txt	http://www.rbnz.govt.nz/statistics/	Monthly average exchange rates of New Zealand dollars to US dollars and to Australian dollars.
OECD2006.txt	:http://stats.oecd.org/index.aspx#	land area, population, foreign-born population, GDP per capita, deposit interest and saving rates, and life expectancy statistics for OECD countries in 2006.
OECDgdpANDedu.txt	http://stats.oecd.org/index.aspx#	GDP, CPI, Gross enrolment rate at tertiary level, and public spending on education statistics for OECD countries.
popbyagebysex.txt	http://www.stats.govt.nz/tools_and_services/tools/TableBuilder/table-by-subject.aspx	The NZ census night population counts classified by age group and sex, for the 1991, 1996, 2001, and 2006 censuses.
radiodiary1.txt	A Test of the Effectiveness of Two Modes for Following Up Non-Responders to Radio Diary Research by Gavin Lees and Mike Brennan, Marketing Bulletin, 2008, Research Note 1.	A test of the effectiveness of two modes for following up non-responders to radio diary research.
radiodiary2.txt	A Test of the Effectiveness of Two Modes for Following Up Non-Responders to Radio Diary Research by Gavin Lees and Mike Brennan, Marketing Bulletin, 2008, Research Note 1.	A test of the effectiveness of two modes for following up non-responders to radio diary research.
radiodiary3.txt	A Test of the Effectiveness of Two Modes for Following Up Non-Responders to Radio Diary Research by Gavin Lees and Mike Brennan, Marketing Bulletin, 2008, Research Note 1.	A test of the effectiveness of two modes for following up non-responders to radio diary research.

realestate.txt	http://www.stats.govt.nz/tools_and_services/tools/TableBuilder/table-by-subject.aspx http://www.rbnz.govt.nz/statistics/ https://www.reinz.co.nz/reinz/public/housing-price-index	Floor area of new buildings, median housing prices, consumer price index (CPI), floating mortgage rates, and permanent and long-term arrivals and departures statistics recorded as quarterly time series.
savingsurvey.txt	http://www.stats.govt.nz/tools_and_services/services/schools_corner/surf_for_schools.aspx	The 2001 Household Savings Survey (HSS)
smallfirm1.txt	Managing Under Recession: Perspective from New Zealand Small Firms. Report from BusinessSMEasure 2009 by Martina Battisti & David Deakins, New Zealand Centre for Small & Medium Enterprise Research, Massey University, March 2010	The performance of New Zealand small firms during the recession
smallfirm2.txt	Managing Under Recession: Perspective from New Zealand Small Firms. Report from BusinessSMEasure 2009 by Martina Battisti & David Deakins, New Zealand Centre for Small & Medium Enterprise Research, Massey University, March 2011	The performance of New Zealand small firms during the recession
smallfirm3.txt	Managing Under Recession: Perspective from New Zealand Small Firms. Report from BusinessSMEasure 2009 by Martina Battisti & David Deakins, New Zealand Centre for Small & Medium Enterprise Research, Massey University, March 2012	The performance of New Zealand small firms during the recession
topTVevent.txt	"TUA NEN" by Vincent Heeringa, originally published in NZ Marketing January-February 2010, page 10.	Top 12 TV audiences in New Zealand history.
tourism.txt	"Diseconomies of scale: A study of development constraints in small tourism firms in central New Zealand" by Jovo Ateljevic and Stephen Doorne, Tourism and Hospitality Research, Vol. 5, No. 1, 2004, pp. 5-24.	Perceived constraints to small tourism firm performance
visitorbycountry.txt	http://www.stats.govt.nz/infoshare/	The actual counts of annual total of visitor arrivals (to New Zealand) classified by the top 8 visitors' country of

		residence.
visitorbypurpose.txt	http://www.stats.govt.nz/infoshare/	The actual counts of annual total of visitor arrivals (to New Zealand) classified by visit purpose.
visitortotal.txt	http://www.stats.govt.nz/infoshare/	The actual counts of monthly total of visitor arrivals (to New Zealand).

Note: some of these may not appear on the BizStats website due to editing requirements.

Appendix 2

Example of workshop activity using data from the dataset *savingsurvey.txt*.

115.101 Statistics for Business - Workshop 1

The aim of this workshop is to:

- Practice selecting a simple random sample;
- Practice constructing a stem and leaf plot, and describing the resulting distribution;
- Understand what a **sampling distribution** is, and how it differs from the **population distribution**.

For this workshop you will work in groups of 2 or 3 people.

Hand in 1 completed worksheet per group - all group members will receive the same mark for this workshop, so you should ensure that each of you is making a contribution to the answers.

Please complete the table below so we can record your marks.

Full Name (please underline family name)	Student ID number

Page 5 contains data from the 2001 Household Savings Survey (HSS) of New Zealanders

(Source: http://www.stats.govt.nz/tools_and_services/services/schools_corner/surf).

For the purposes of this workshop we will treat this dataset as a population from which we wish to sample - i.e. consider the 300 data points on page 5 are the population

Each person in the group needs to select a random sample of size 10 from the population of 300.

To do this:

Generate 10 different random numbers between **001** and **300**.

Use either your calculator or the random number table on page 6 [i.e. for the latter use a random starting point (e.g. close your eyes and point) then consider 3 digits at a time, discarding numbers more than 300].

Then use the table entries on page 5 that correspond to the random numbers.

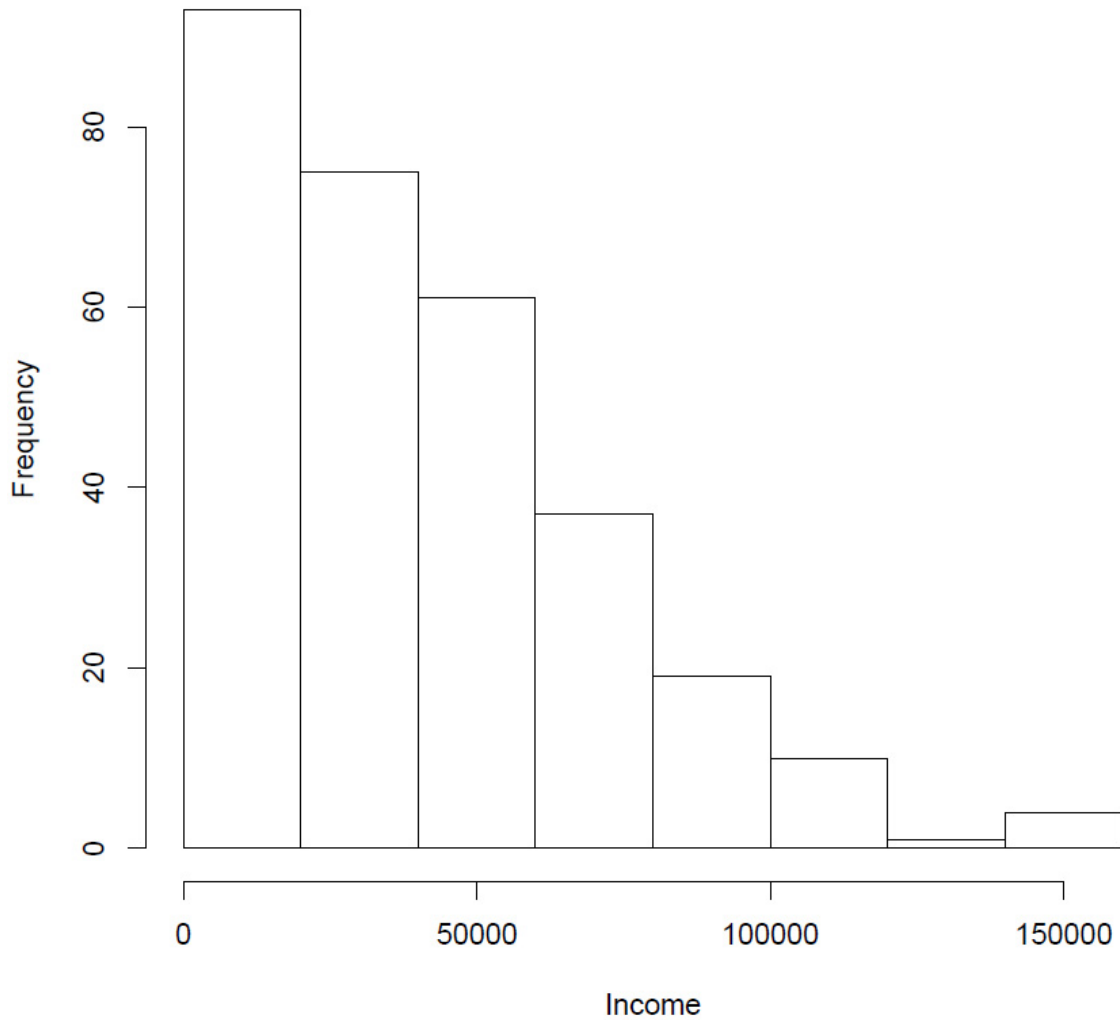
Using your results, fill in the table below.

Sample Number	Random Number(=ID)	Income	Sample Number	Random Number(=ID)	Income	Sample Number	Random Number(=ID)	Income
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
10			10			10		
Sample mean:			Sample mean:			Sample mean:		

The histogram on the next page is of our population (i.e. all 300 respondents). The mean income (in thousands of dollars) of this population is 40.6 and the standard deviation is 40.

Are these parameters or statistics?

Histogram of Income

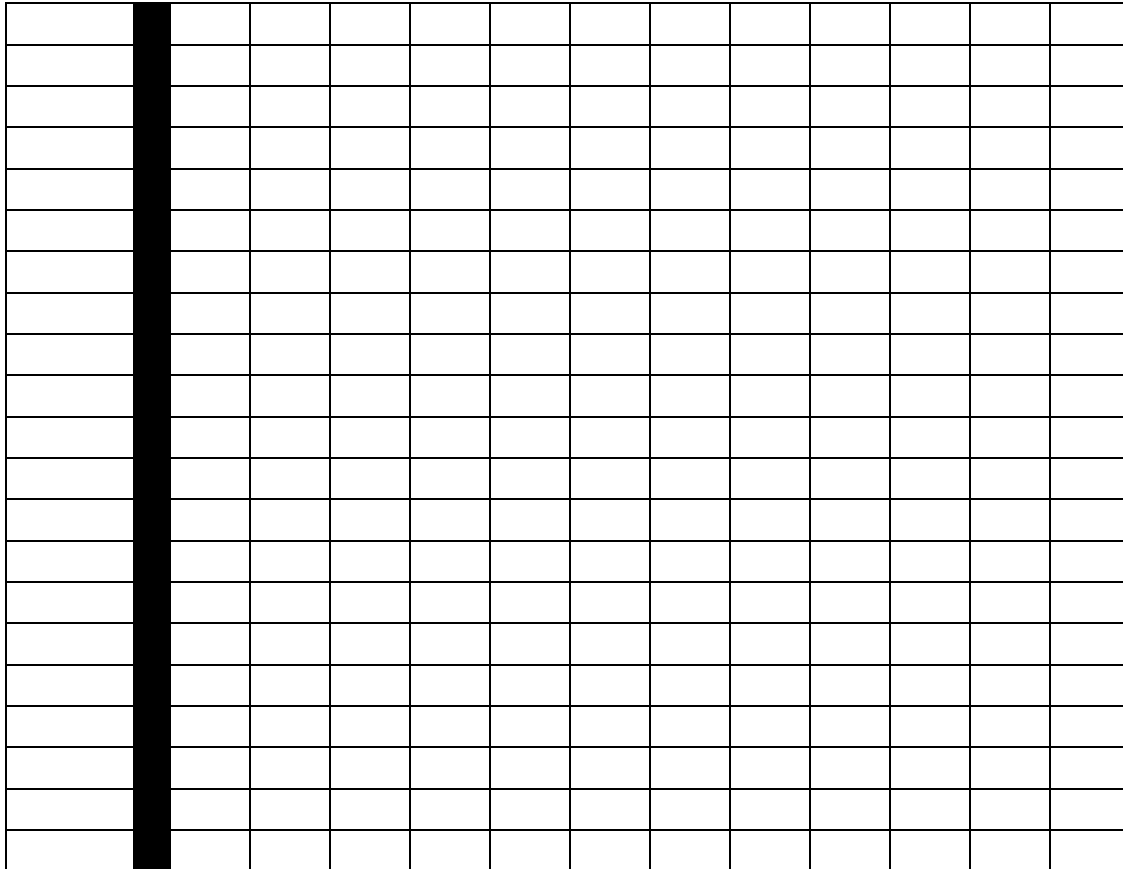


Describe the major features of the distribution above (i.e. location, spread, and shape).

Shortly we will examine the distribution of the sample means each person in the class has created. How do you expect these to differ from the population ?

Draw a stem and leaf plot of the sample means calculated by each person in the class below:

Stem unit:



Does the distribution have the properties you expected? Explain.

If another person were to take a random sample of 10 incomes from this population, between what two values do you think their sample mean is likely to lie?

The HSS data:

To sample: match your random number with the equivalent ID column value and record the associated income (recorded in \$1,000s). This will give you a random sample.

ID	Income	ID	Income	ID	Income	ID	Income	ID	Income	ID	Income
1	157	51	45	101	39	151	3	201	74	251	22
2	35	52	9	102	6	152	2	202	17	252	63
3	16	53	2	103	94	153	46	203	31	253	64
4	51	54	2	104	0	154	23	204	19	254	32
5	22	55	84	105	4	155	49	205	42	255	13
6	3	56	73	106	9	156	3	206	53	256	17
7	21	57	63	107	61	157	33	207	45	257	64
8	81	58	58	108	66	158	23	208	42	258	0
9	18	59	5	109	42	159	143	209	3	259	35
10	82	60	11	110	60	160	63	210	11	260	21
11	39	61	40	111	76	161	4	211	31	261	54
12	9	62	92	112	0	162	12	212	29	262	91
13	21	63	99	113	105	163	48	213	39	263	34
14	13	64	40	114	61	164	1	214	80	264	33
15	37	65	9	115	26	165	16	215	10	265	51
16	91	66	3	116	13	166	25	216	66	266	50
17	12	67	22	117	7	167	19	217	6	267	59
18	10	68	144	118	13	168	24	218	6	268	26
19	16	69	20	119	2	169	15	219	62	269	5
20	21	70	15	120	62	170	96	220	5	270	27
21	1	71	42	121	24	171	3	221	6	271	36
22	61	72	8	122	10	172	34	222	56	272	28
23	42	73	37	123	40	173	13	223	59	273	33
24	0	74	117	124	27	174	2	224	19	274	26
25	62	75	59	125	16	175	62	225	62	275	3
26	3	76	104	126	30	176	65	226	84	276	59
27	58	77	33	127	59	177	78	227	76	277	55
28	43	78	104	128	54	178	136	228	41	278	75
29	70	79	9	129	44	179	59	229	143	279	26
30	44	80	95	130	30	180	33	230	50	280	7
31	41	81	62	131	23	181	5	231	52	281	40
32	9	82	63	132	16	182	77	232	37	282	54
33	0	83	4	133	35	183	70	233	43	283	82
34	46	84	28	134	20	184	34	234	39	284	19
35	75	85	72	135	42	185	49	235	54	285	21
36	60	86	52	136	78	186	94	236	15	286	98
37	36	87	31	137	26	187	10	237	11	287	16
38	7	88	35	138	49	188	65	238	1	288	43
39	21	89	105	139	31	189	9	239	36	289	22
40	86	90	35	140	39	190	1	240	0	290	105
41	68	91	95	141	42	191	18	241	63	291	18
42	16	92	99	142	27	192	55	242	103	292	42
43	40	93	50	143	3	193	103	243	16	293	36
44	21	94	9	144	67	194	11	244	24	294	87
45	5	95	35	145	7	195	0	245	4	295	24
46	47	96	83	146	13	196	53	246	57	296	59
47	63	97	43	147	65	197	14	247	29	297	26
48	45	98	30	148	57	198	51	248	39	298	50
49	101	99	47	149	53	199	31	249	16	299	15
50	39	100	112	150	20	200	59	250	44	300	21

Table of Random Numbers

Row	Column							
	00000 12345	00001 67890	11111 12345	11112 67890	22222 12345	22223 67890	33333 12345	33334 67890
01	06839	24349	52108	71049	94608	62200	85105	38625
02	08613	10291	84369	08692	83432	08188	40240	19164
03	51836	99858	29056	77270	90839	51237	20618	15212
04	84319	21682	60644	06122	41630	65640	70235	02118
05	15545	84540	83592	75732	86705	48445	95334	94165
06	94760	56356	93145	97892	18928	12523	11847	67643
07	70543	29776	10087	10072	55980	64688	68329	20461
08	86670	11370	83628	31391	15721	17299	16360	97092
09	81975	97350	92377	56464	53354	14993	63271	03037
10	65406	76832	89727	30438	51690	71037	78885	47360
11	54208	02022	78283	42361	48400	61328	25203	35060
12	39487	20462	82677	95100	96216	54848	86696	65019
13	32695	22002	01897	51959	15261	97786	79926	77219
14	50644	92341	06029	27186	12296	80383	63398	51085
15	76694	34540	41747	19006	79558	63154	59237	87095
16	33423	66304	90157	55079	52508	04372	57974	87159
17	15522	65155	09544	54572	75382	48692	27870	31576
18	49912	04808	35627	16456	30798	87198	90297	26605
19	41920	19685	50560	73474	07948	74920	05881	74055
20	40459	65362	43036	76975	96671	28229	60660	64130
21	75793	81136	62528	07728	17606	27816	98082	88933
22	74919	97323	34341	88662	70712	81778	60022	95711
23	10576	88542	95713	16149	18068	62587	83346	59924
24	86703	33324	00272	93967	69639	48082	29644	55826
25	16429	68467	34943	97476	32257	12232	51645	27852
26	27580	80332	56864	82069	19485	87738	00774	21687
27	10672	28550	14184	22378	93620	63706	77349	63528
28	02587	31612	83301	16173	53502	65219	36256	91560
29	11091	46390	20951	81329	56204	02694	77653	53628
30	99609	80357	07405	42114	22598	54031	60395	59577
31	74557	46215	94277	15296	41716	11342	12964	44977
32	54771	23561	13476	68317	65394	52436	91188	80906
33	48862	94312	55410	06921	93718	23791	68288	75208
34	00206	43288	54221	29162	23535	62894	06000	44708
35	76453	64617	27539	76904	92549	49426	32976	76078
36	79933	45537	37197	31888	89396	83764	64843	48094
37	53666	73276	61667	48209	79118	39709	02340	02314
38	63508	33760	77126	79409	95456	93925	57459	23116
39	11835	50736	99354	78064	91867	45042	77536	06967
40	10311	84193	84506	52978	16608	29145	54907	65855
41	40345	47582	23579	86417	21783	56615	33901	58145
42	94764	96145	57069	94030	93941	15573	61875	90800
43	33758	58402	87890	88553	99365	88216	86624	56414
44	34702	33020	09255	14284	02020	56399	17967	72704
45	60319	16651	54904	34068	03762	65712	76230	79628
46	21679	25688	02261	24438	23095	37706	27018	63538
47	86810	78958	66432	53350	68541	59239	11534	00768
48	34061	31166	03642	88818	06795	59120	43465	92691
49	70257	14526	81272	89265	90265	12622	83983	21136
50	17043	02370	01708	93377	78282	27529	83961	01005