

Instructions: All of the questions on this examination should be answered on the sheets provided. Write your name and your student number at the top of each sheet. Be certain to indicate the proper number before each of your answers. You will answer a total of six questions for this test (two questions from each group). Remember to show your work if an answer requires a mathematical solution. If you need additional space, you may write on the back of the answer sheets.

Answer any two of the following four questions. Each answer is worth 15%.

1. When the owner of a small business reviews her list of contracts for 2011, she finds that 35% of the contracts were from clients she met at a large conference at the end of 2010. Answer the following questions about this situation.
 - a. Was this measurement obtained by a sample or a census? What words in the description of the situation make you confident that your answer is correct?
 - b. Should the owner have taken into account some measure of reliability associated with the value 35%?

2. An instructor wishes to review students doing poorly in his large-room lecture courses, so that he can schedule individual appointments with them and offer extra help. He has time to meet with only 15 students. The data in the table below lists student ID numbers and their current averages in the course. The professor asks you, as the teaching assistant, to answer the following questions.

- Create a Pareto chart showing the grades of the 15 students currently doing the worst.
- Report what percentage of the total range of grades is represented by the range of the 15 worst grades.

82537148	83	31095586	72	72035950	61
52876875	77	61876472	83	84995609	61
61276723	68	64008887	77	70350224	90
91870406	71	73326752	65	10307329	74
80818704	67	26409017	51	86481961	68
15083730	77	61190128	80	55528820	70
65224586	63	77299160	81	20706744	85
30885810	74	99352189	99	10509111	58
30657188	72	27296942	67	65629327	64
52933093	86	70839462	68	79414847	80
82201643	64	80110862	79	13149325	53
26248550	62	27631804	65	43768964	72
94046676	92	11487151	82	72972689	76
47818150	71	13727582	63	50076075	76
22293475	47	60851229	74	76016688	79
60266252	63	80904965	61	60733395	74
49270868	77	92532056	68	57588119	77
51503728	62	92991088	65	14745234	69
14163607	78	27476858	79	19646827	70
74601163	78	54767843	63	10285241	68
47727370	75	64897314	47	81058629	66
45242227	55	53891369	91	77577724	80
70858879	66	90803628	58	97965137	57
55422066	70	47261761	60	17238270	74
52304732	81	65387482	59	63140408	65
48766107	62	86528875	71	12913224	62
27624168	74	47939048	57	40917560	60
43739117	89	78952719	64	73741404	71
75066428	68	91597615	85	14639971	49
43158042	52	42693561	69	74062874	68
98146249	74	28025251	65	97173669	72
87412748	70	87934696	70	82394086	73
77431632	89	86993274	74	30251061	52
58766590	56	10283072	70	85732777	54
33281753	65	51148388	75	32807943	81
21676184	56	96705165	74	39939709	63
12004042	78	74068061	65	25757411	74
52053760	74	51319884	78	28650628	61
40298546	65	41163546	65	21287219	74
31141482	47	39555188	68	32693323	57

3. Assume that the number of sales per day of an app in the Apple iOS App Store is normally distributed.
- What two parameters of the distribution would you need to be able to determine the probability of sales on a particular day exceeding 100 units?
 - If the probability of sales exceeding 100 units is 20% and the mean daily sales is 86 units, then what is the standard deviation of the distribution?
4. Researchers are studying a new chemical process for producing dyes. Although they don't know it, the yield of the process is normally distributed with $\mu = 550\text{kg}$ and $\sigma = 75\text{kg}$. The researchers plan to estimate the process's mean yield by running the process 35 times, recording the yield each time. Have they chosen a large enough sample to be 90% confident that their computed mean will be within 20kg of the actual mean? Show your work to justify your answer.

Answer any two of the following three questions. Each answer is worth 20%.

5. A health inspector at a restaurant will enter the kitchen and choose 5 stations to inspect from a predetermined list of 15 stations present in most restaurant kitchens.
- How many different sets of 5 stations exist?
 - If all sets are equally likely, what is the probability of each set?
 - If the inspector were instead to randomly select 13 stations to inspect, how many different sets of 13 stations would exist?
 - If all sets were equally likely, what is the probability of each set?
6. The company policy for customer service representatives gives time off for positive reviews. If, in the first 20 calls a customer service agent handles in a day, 13 or more elect to take a subsequent survey and rate the service as "excellent," then the company gives the agent his or her final hour of work that day off, paid. Ellie receives excellent reviews from about 30% of the calls she handles. Assuming she always receives at least 20 calls in the first 7 hours of a workday, on what percentage of her 8-hour workdays does Ellie get the final hour off?

7. A quality control analyst measures the number of hours a patient in a low-risk condition waits for care at the emergency room of a small hospital. The following data are obtained for 20 patients.

2.26 2.01 3.0 1.22 1.92 1.79 0.78 1.89 0.71 1.58
 2.02 2.77 2.87 0.51 0.74 1.95 2.76 2.61 3.54 2.95

- Compute the sample mean, sample median, and range of the data.
- Compute the sample standard deviation and sample variance.

Answer any two of the following three questions. Each answer is worth 15%.

8. Since careful records have begun being kept in January, Eric's small business has delivered the following quantities of flowers throughout town.

	January	February	March	April	May	June	July	August
Small Bouquets	85	34	26	24	43	29	30	19
Large Bouquets	23	64	27	18	33	23	20	13

Assuming the data is normally distributed, construct two separate 90% confidence intervals, one for the number of deliveries of small bouquets in September and one for the number of large bouquets in September.

9. Consider the following data values of variables x and y

x	5	4	3	6	9	8	10
y	7	8	10	5	2	3	1

Construct a scatter diagram of the data points and plot the least squares regression line on it. Find the least squares regression line.

10. A quality control experiment is to be done on a machine that fills tubes with toothpaste. Its specifications require that it fill tubes with 4.7oz. A random sample of 40 tubes filled by the machine is taken and each tube is weighed. The resulting data are below, with the weight of the tube already having been subtracted from each. Perform a hypothesis test at the 90% confidence level to determine if the machine is performing according to specifications.

4.66	4.61	4.71	4.63	4.70	4.62	4.63	4.61	4.70	4.56
4.60	4.66	4.68	4.57	4.67	4.72	4.67	4.64	4.66	4.75
4.69	4.64	4.67	4.65	4.69	4.65	4.75	4.53	4.57	4.74
4.68	4.67	4.66	4.68	4.64	4.65	4.64	4.80	4.71	4.69