

Problem I. Below are the average homework scores for 25 of Dr. L.'s calculus students on their on-line homework system. For your convenience the data have been sorted from largest to smallest. (17 points total)

56 60 61 65 66 70 73 74 76 76 77 79 80
84 84 86 87 87 88 89 89 90 92 94 94

(a) To your right is a frequency table for the data using 8 classes. I have given you the class boundaries using the convention we discussed in class. Note that the variable X is the average homework score for each student. Please use the data above to complete the table. (5 points)

Class Limits For X	Number of Students	Percent of Students
$55 \leq X < 60$	1	4
$60 \leq X < 65$	2	8
$65 \leq X < 70$	2	8
$70 \leq X < 75$	3	12
$75 \leq X < 80$	4	16
$80 \leq X < 85$	3	12
$85 \leq X < 90$	6	24
$90 \leq X < 95$	4	16

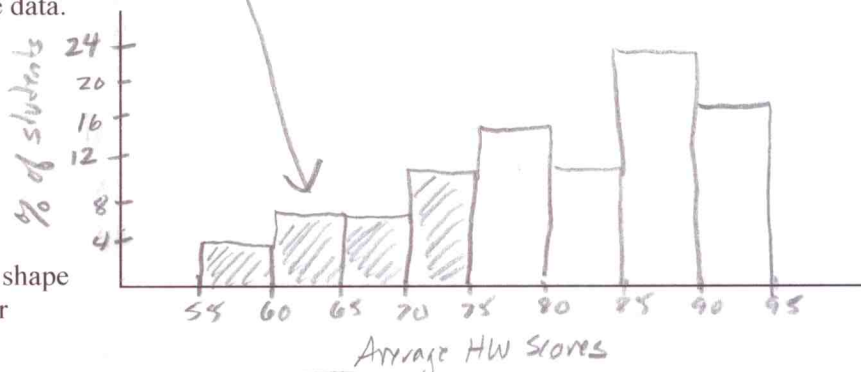
(b) Use the frequency table to graph a *percent* frequency histogram (i.e. graph the percent of students on the vertical axis) on the axes provided below. Be sure to label your axes! (4 points)

(c) What percent of the students have an average homework score less than 75? Shade the area on the histogram that corresponds to this percent. Clearly indicate this on the histogram. (3 points)

$\frac{1+2+2+3}{24} = \frac{8}{24} = 32\%$ or $4\% + 8\% + 8\% + 12\% = 32\%$

(d) Find the five number summary for these data. Clearly indicate your answers. (3 points)

min = 56
 $Q_1 = 71.5$
med = 80
 $Q_3 = 88.5$
max = 94



(e) Circle all words below that describe the shape of the distribution of homework averages for these 25 students: (2 points)

Symmetric Skewed Left Skewed Right Unimodal Uniform

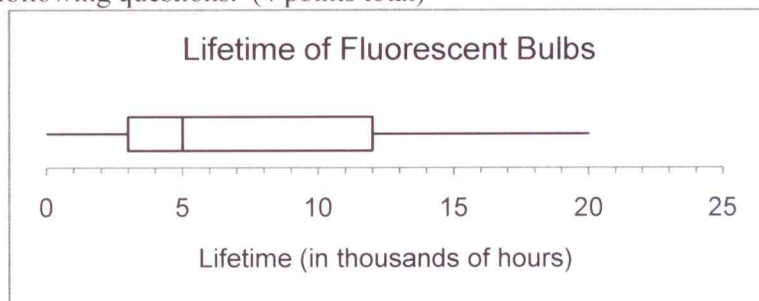
Problem II. The following boxplot shows the lifetimes of a sample of fluorescent bulbs (measured in thousands of hours). Use the boxplot to answer the following questions. (4 points total)

1. What are the median (50th percentile) and the 75th percentile for the lifetime of fluorescent bulbs? Clearly indicate your answers. (2 points)

med = 5000 hrs. $Q_3 = 12,000$ hrs

2. Based on the box plot, do you think the mean lifetime of fluorescent bulbs is larger or smaller than the median lifetime? Why? (2 points)

Larger b/c the data appear to be skewed to the right.



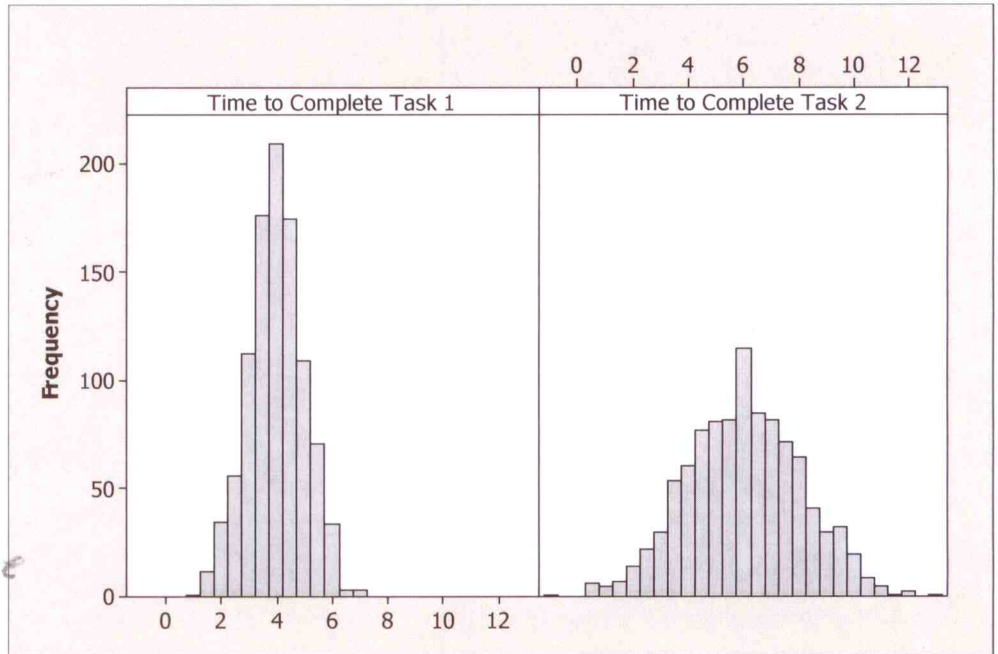
Problem III. Subjects were timed (in minutes) as they completed two tasks, Task 1 and Task 2. Below are the histograms of the distributions of the times of the subjects to complete each task. Note that the histograms are graphed using the same horizontal and vertical scales. Please answer the following: (3 points each, 6 points total)

(a) Which task has a longer mean completion time? What is that mean time, approximately (i.e. estimate the mean time from the histogram)?

Task 2
mean \approx 6 min.

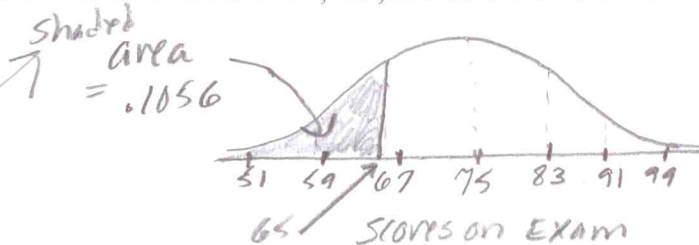
(b) Which task has the smaller standard deviation? Why?

Task 1. More data is closer to the mean for task 1.



Problem IV. The distribution of scores on a University entrance exam can be modeled with a normal distribution with mean 75 and standard deviation 8. Please answer the following being sure to show all calculator input. (13 points)

(a) Draw a graph of the distribution. Be sure to draw the distribution with proper shape, label your axis, and show variable values at ± 1 , ± 2 , and ± 3 standard deviations from the mean. (4 points)



(b) What percent of students who take this exam score have a score less than 65? Clearly represent this percent graphically on the distribution drawn in part (a). (3 points)

$$\text{normalcdf}(-1E99, 65, 75, 8) = .1056 \quad \text{10.6\%}$$

(c) What exam score corresponds to a z-score of -2.1 ? (3 points)

$$z = \frac{x - \mu}{\sigma} \Rightarrow -2.1 = \frac{x - 75}{8} \Rightarrow x = 75 - 2.1(8) \Rightarrow x = 58.2$$

(d) Suppose the university gives scholarships to those who score in the top 7%. What scores constitute this range? (3 points)

$$\text{invNorm}(.93, 75, 8) = 86.8$$

Scores of 86.8 or higher are in the top 7%.