Pledge:

2//2007 MATH 271 Name: Solution
Dr. Lunsford Quiz 2 20 Points Possible

I. One hundred 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 to complete each task. Notice that the histograms are graphed using the same horizontal and vertical scales. Please answer the following: (7 points total)

(a) Which task has a shorter mean completion time? What is that mean time, approximately (i.e. estimate the mean time from the histogram)? (2 points)

Task 2 has a shorter mean completion time of approximately 30 min.

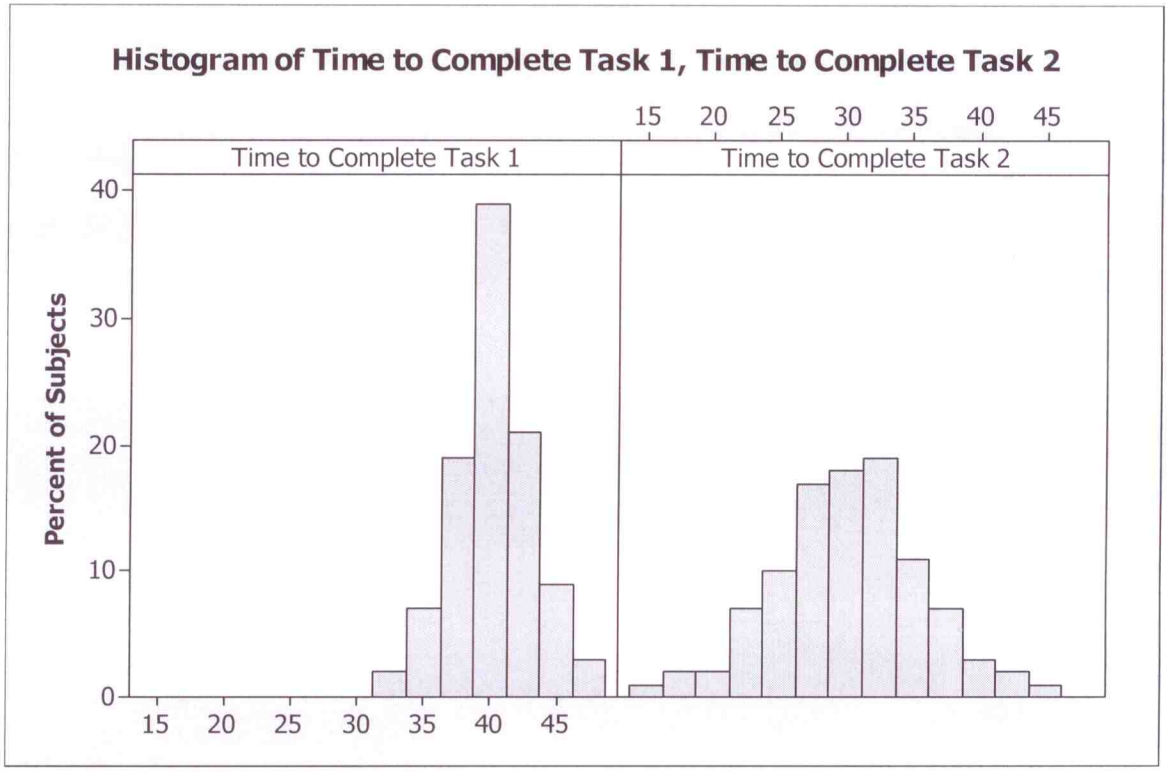
(b) Use the histogram to approximate the standard deviation of the time to complete Task 2. (1 point) $\frac{45-15}{6} = \frac{30}{6} \approx 5$ min

(c) Which task has the smaller standard deviation? Why? (2 points)

Task 1. It has much more data closer to the mean than Task 2.

(d) Which task has a larger range of completion times? What is that range, approximately (i.e. estimate the range from the histogram)? (2 points)

Task 2. Range = max - min $\approx$ 45 - 15 = 30 min



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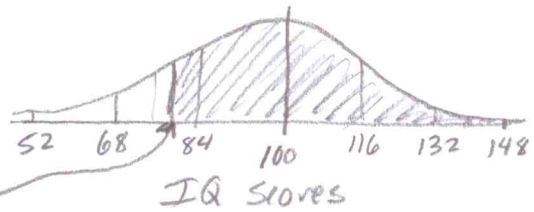
II. A certain IQ test is rescaled so that the IQ scores follow a normal distribution with a mean of 100 points and a standard deviation of 16 points. Please use this information to answer the following questions. Please be sure to show all work including calculator input. (13 points total)

(a) Draw a graph of the density function that represents IQ scores using this normal model. Please be sure to label your horizontal axis and to clearly mark the data values that are $\pm 1\sigma$, $\pm 2\sigma$, and $\pm 3\sigma$ from the mean. (3 points)



(b) According to this model, what percent of people would you expect to have an IQ score over 80? Clearly represent this percent on your graph in part (a) above. Please give your answer using a complete English sentence. (2 points)

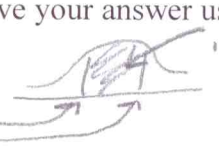
normalcdf(80, 1E99, 100, 16) = .8944

We would expect about 89.44% to have an IQ score over 80.

(c) What IQ score corresponds to a standardized score (i.e. z-score) of 1.25? (1 point)

$X = \mu + z\sigma = 100 + 1.25(16) = \boxed{120}$

(d) What IQ scores consist of the middle 80% of scores? Please give your answer using a complete English sentence. (2 points)



invNorm(.1, 100, 16) = 79.495

invNorm(.9, 100, 16) = 120.50

IQ scores from about 79.5 to 120.5 comprise the middle 50% of scores.

(e) How likely is it that a random sample of 25 people who take the IQ test will have ***an average*** IQ score greater than 110? (3 points)

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{16}{\sqrt{25}} = \frac{16}{5} = 3.2$

normalcdf(110, 1E99, 100, 3.2) = .000889 → or an .089% chance.

(f) According to the "Weekly World News," a random sample of 25 aliens were recently given the IQ test. The aliens had an average score of 110. Do you think this gives us a reason to believe that aliens are smarter on average than humans? Why or why not? (2 points)

If the aliens had the same average & std deviation in IQ scores as humans, then it would be very unusual for 25 randomly selected aliens to have an IQ score of 110 or higher. Thus the aliens appear to be smarter than humans, on average.