MA1020 Quantitative Literacy – Chapter 11 Quiz

Name _____

November 16, 2006

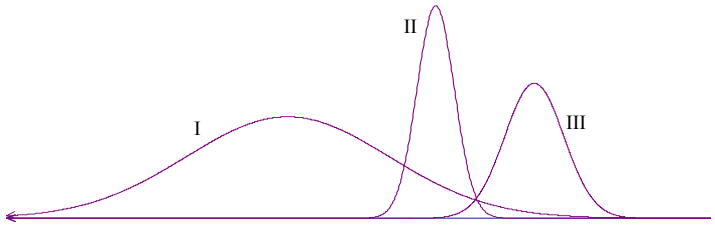
1. Approximately what percentage of data in a standard normal distribution lies below -2?

   (a) 99%
   (b) 97.6%
   (c) 47.73%
   (d) 2.4%
   (e) None of the above.

   D [2]

   Since some of you may have gotten 2.5 and then decided that 2.4 was not close enough, I accepted E if there was work that indicated that your calculation was 2.5. Since the problem said approximately, the idea is that 2.4 is close enough.

2. Consider the following normal distributions.



   Which distribution has the smallest mean?

   I [2]

3. Explain why we might expect the histogram for a data set to be approximated more and more closely by a normal curve, the larger the data set becomes. [2]

   As the size of the data set increases, there are more and more outcomes that are close to the theoretical mean. There are fewer values in proportion to the entire data set that are far from the theoretical mean.

4. Consider the normal curve below, which gives the distribution of ages of students registering for a conference. Two areas between the curve, the horizontal axis, and the vertical lines are marked.

   What percentage of the registrants is between the ages of 30 and 40?

   40% [2]

5. Suppose that the weights of checked luggage for individuals checking in at a particular airport have a normal distribution with a standard deviation of 11.3 pounds. Checked luggage weighing 45.16 pounds has a z-score of -0.9239. What is the mean of the normal distribution?

$$-0.9239 = \frac{45.16 - \mu}{11.3}$$
$$11.3 * -0.9239 = 45.16 - \mu$$
$$-\mu = 11.3 * -0.9239 - 45.16$$
$$\mu = -(11.3 * -0.9239 - 45.16)$$

   55.6 [2]

6. What information does a z-score tell you? [2]

   A z-score tells how many standard deviations above or below a data value is from the mean.

MA1020 Quantitative Literacy – Chapter 11 Quiz –Take-Home

Name _____

The following is the TAKE-HOME portion of the quiz. You are NOT to discuss this problem with anyone or work with another person for this section. If evidence is found indicating that you have collaborated with another person, you will automatically receive a score of zero. This take-home is due by noon sharp on Monday, November 27.

The equation for the normal distribution with mean μ, standard deviation σ and variable x is as follows:

$$y = \frac{1}{\sigma\sqrt{2\pi}}(2.7183)^{\frac{-(x-\mu)^2}{2\sigma^2}}.$$

Note that $\frac{-(x-\mu)^2}{2\sigma^2}$ is in the exponent of 2.7183. You will use this formula for the following problem.

The length of human pregnancies from conception to birth varies according to a distribution that is approximately normal. The mean is $\mu = 266$ days with standard deviation $\sigma = 16$ days.

1. Using a computer, graph a normal curve representing this distribution. Though you can use any program, I found a nice graphing program on the web at http://gcalc.net/. The most straight forward option appears to be GCalc3. Using the program you will need to write the equation above with a lot of parenthesis so that the computer can interpret what operations to do first. Here is the equation above written horizontally with the parenthesis that you will need.

   $$y = 1/(\sigma * \text{sqrt}(2 * \text{pi})) * 2.7183\hat{}((-(x-\mu)\hat{}2)/(2 * \sigma\hat{}2))$$

   To see the normal distribution you will first have to change the "view" option. Print your graph. [3]

2. On your printed graph, label μ, 1, 2 and 3 standard deviations. [3]

3. The 68-95-99.7 rule says that

   - 68% of pregnancies last between _____ and _____. [1]
   - 95% of pregnancies last between _____ and _____. [1]
   - 99.7% of pregnancies last between _____ and _____. [1]
   - Only 0.3% last less than _____ or more than _____ days. [1]