Economics 250 Midterm Test 1: Answer Guide

1. (a) The mean is 21. The median is 19 (the average of 21 and 17). The mode is 5.

(b) The interquartile range is (8.5, 31), averaging the two nearest observations. An equally acceptable answer is (6.75, 33) which runs from position 2.25 to position 6.75.

(c) The sample standard deviation is 14.47 (the square root of the sample variance which is 209.42).

2. (a) No. The probability of a recession in both years is 0.2. That is not equal to the product of the two marginal probabilities, which is 0.09.

(b) $P(y = 1|x = 1) = 0.2/0.3 = 0.67$

(c) Using the two conditional probabilities given $x = 0$:

$$E(y|x = 0) = 1 \times 0.1/0.7 + 0 \times 0.6/0.7 = 0.142$$

3. (a) The mean is 2.9. The variance is 0.49.

(b) The mean of r is
$$E(r) = 0.5(2.9) + 0.5(4) = 3.45$$

and the variance is:

$$\sigma_r^2 = 0.25(0.49) + 0.25(2) + 2(0.5)(0.5)(0.6)(0.7)(1.4142) = 0.1225 + 0.5 + 0.2969 = 0.9194$$

4. (a) The probability that a school fails to improve is 0.4. If 6 improve then 4 fail to do so. Using table 2, that probability is 0.2508. (Or the binomial formula gives the same answer directly.)

(b) This is the probability that 5 or fewer fail to improve, which from table 3 is 0.834.

(c) The mean is 6 and the variance is 2.4.