Economics 250 Midterm Test 2: Answer Guide

1. (a) The marginal probabilities are 0.5 and 0.5 so the mean is 1.5.

(b) The conditional probabilities are .8 and .2 so the conditional mean is .8(3) + .2(0) = 2.4.

2. (a) The mean return on the portfolio is 0.5(2)+0.5(6) = 4. The variance is

$$\sigma_p^2 = (0.5)^2(1) + (0.5)^2(4) + 2(0.5)(0.5)[(0.8)(1)(2)] = 2.05$$

With $r_p \sim N(4, 2.05)$,

$$z = \frac{0-4}{1.4317} = -2.794$$

so the probability is 0.0026 or 0.26 percent.

(b) The corresponding z statistics for holding just the first asset or just the second asset are -2 and -3 respectively. So holding just the second asset would reduce the probability of the return being negative.

3. (a) With $n = 30$ the degrees of freedom are 29 and $t_{29,0.025} = 2.045$. The 95% confidence interval is:

$$30 \pm 2.045\frac{4}{\sqrt{30}} = (28.512, 31.488)$$

(b) Increasing the sample size n would increase the efficiency of the estimator (reduce the sample variance of $\overline{X}$).

4. (a) We know that

$$\hat{p} \sim N(P, \frac{P(1-P)}{n}),$$

so with $P = 0.15$ the variance is 0.001275 and the standard deviation is 0.0357. Thus

$$z = \frac{0.2 - 0.15}{0.0357} = 1.400$$

so using table 1 the probability is $1 - 0.9192$ or 0.0808 or 8.08 percent.

(b) Now we need to construct the margin of error using $\hat{p} = 0.20$. The 90% CI is

$$0.2 \pm 1.645(0.04) = 0.2 \pm 0.0658 = (0.1342, 0.2658)$$

(or you can quote everything in percentage terms if you wish).