**Economics 250 Midterm Test 1: Answer Guide**

**1.** (a) The mean is

$$\overline{x} = \frac{80 \cdot 15 + 120 \cdot 30}{200} = 24$$

The variance is

$$s^2 = \frac{80 \times (15-24)^2 + 120 \times (30-24)^2)}{199} = 54.2713$$

so the standard deviation is

$$s = 7.367.$$

(b) The CV is $100 \times 7.367/24 = 30.69\%$

**2.** (a) Standardizing, this means $z > 2$ so the probability is 1-0.9772 = 0.0228 or 2.28%.

(b) This leaves 5% in each tail so for $z$ the value is 1.645. Thus for $x$ it is 3.29.

(c) This leaves 2.5% in each tail so for $z$ the value is 1.96 so for $x$ it is 3.92.

(d) This is equivalent to $-1 < z < 2$ which leaves 0.0228 in the right tail and 0.1587 in the left tail, so $1 - 0.0228 - 0.1578 = 0.8185$ or 81.85%.

**3.** (a) Standardize to get $z = (16-20)/4 = -1$ so from Table A the probability is 0.1587.

(b) The probability of more than 8 years experience is 0.20.

(c) From part (b) we know 20% of workers have high experience (more than 8 years). Now we also know 10% of workers have high experience and high wages (above 16). That means 10% of workers have high experience (more than 8 years) and low wages (less than 16). From the addition rule the probability of low wage *or* high experience is the probability of low wage (0.1587) plus the probability of high experience (0.20) minus the probability of both (0.10) which is 0.2587.

**4.** (a)

$$E(r_1) = 0.3(-1) + 0.4(2) + 0.3(6) = 2.3$$

and

$$\sigma_1^2 = 0.3(-1-2.3)^2 + 0.4(2-2.3)^2 + 0.3(6-2.3)^2 = 3.267 + 0.036 + 4.107 = 7.41$$

so $\sigma_1 = 2.722$.

(b) Call $w = r_1 - r_2$, so

$$E(w) = 2.3 - 1 = 1.3.$$

Then

$$\sigma_w^2 = 7.41 + (-1)^2 1 + 2(1)(-1)(1)(2.722)(0.5) = 7.41 + 1 - 2.722 = 5.688$$

so

$$\sigma_w = 2.385.$$

(Notice that the investment strategy has a high expected return but also a high variance or risk.)