

### Homework Solutions - Section 9.3

1.

$$(a) E(X) = -1 \cdot P(X = -1) + 0 \cdot P(X = 0) + 1 \cdot P(X = 1) + 2 \cdot P(X = 2) \\ = -1 \cdot 1/5 + 0 \cdot 1/5 + 1 \cdot 1/5 + 2 \cdot 2/5 = 4/5$$

$$(b) E(X^2) = (-1)^2 \cdot P(X = -1) + 0 \cdot P(X = 0) + 1^2 \cdot P(X = 1) + 2^2 \cdot P(X = 2) \\ = 1 \cdot 1/5 + 0 \cdot 1/5 + 1 \cdot 1/5 + 4 \cdot 2/5 = 10/5 = 2$$

$$(c) E(3X + 2) = 3 \cdot E(X) + 2 = 3 \cdot 4/5 + 2 = 4.4$$

2.

$$V(X) = E(X^2) - \mu^2 = 2 - (4/5)^2 = 34/25$$

$$\sigma = \sqrt{\frac{34}{25}} = \frac{\sqrt{34}}{5} \approx 1.166$$

3.

$$V(X^2) = E(X^4) - (E(X^2))^2 = 1 \cdot 1/5 + 0 \cdot 1/5 + 1 \cdot 1/5 + 2^4 \cdot 2/5 - 2^2 = 14/5$$

$$\sigma = \sqrt{\frac{14}{5}} \approx 1.67$$

7. Using the results exercise 9 from section 9.2

$$(a) E(X) = 2 \cdot 1/12 + 3 \cdot 5/12 + 4 \cdot 5/12 + 5 \cdot 1/12 = 42/12 = 3.5$$

$$(b) V(X) = E(X^2) - \mu^2 = 4 \cdot 1/12 + 9 \cdot 5/12 + 16 \cdot 5/12 + 25 \cdot 1/12 - (3.5)^2 = 7/12$$

$$\sigma = \sqrt{\frac{7}{12}} \approx 0.76$$