

Score:

Name: Solutions

Section (circle one): 1 2 3 4 5 6

Team (circle one): a b c d e f

SM316 – Quiz #03 (Section 4.1-4.3) – Due Monday

Take home quiz, open book, open notes. You may work with team members to solve problems, but you may not copy another's work. Calculators are allowed, but you must show all work for full credit.

1. An attendant at a car wash is paid according to the number of cars that pass through. Let x be his earnings on a given hour on a Friday afternoon. The probability distribution of his earnings during that hour is:

x	\$7	\$9	\$11	\$13	\$15	\$17
$f(x)$	$1/12$	$1/12$	$1/4$	$1/4$	$1/6$	$1/6$

Calculate the attendant's expected earnings during this period.

$$E(x) = \sum x f(x) = 7\left(\frac{1}{12}\right) + 9\left(\frac{1}{12}\right) + 11\left(\frac{1}{4}\right) + 13\left(\frac{1}{4}\right) + 15\left(\frac{1}{6}\right) + 17\left(\frac{1}{6}\right)$$
$$\approx \underline{\underline{\$12.67}}$$

↑
 μ

2. Find the variance of the attendant's expected earnings during this period.

$$\sigma^2 = E(x^2) - \mu^2$$

$$\Rightarrow E(x^2) = \frac{7^2}{12} + \frac{9^2}{12} + \frac{11^2}{4} + \frac{13^2}{4} + \frac{15^2}{6} + \frac{17^2}{6} = 169$$

$$\Rightarrow E(x^2) - \mu^2 = 169 - (12.67)^2 = \underline{\underline{\$8.47}}$$

3. Suppose that a grocery store purchases 5 cartons of skim milk at wholesale for \$1.20 per carton and retails it for \$1.65 per carton. After the expiration date, unsold milk is removed and the grocer receives a credit equal to $\frac{3}{4}$ of the wholesale price. If the probability distribution of the random variable X , the number of cartons sold from this lot is:

x	0	1	2	3	4	5
$f(x)$	1/15	2/15	2/15	3/15	4/15	3/15

What is the expected profit?

Profits for sold cartons: $\$1.65 - 1.20 = \underline{.45}$ per carton sold (x)

Loss for unsold cartons: $\frac{1}{4}(1.20) = \underline{.30}$ percent unsold

$$\begin{aligned} \text{Profit for lot} \Rightarrow P &= .45(x) - .30(5-x) \\ &= .45x - 1.50 + .3x \\ &= .75x - 1.50 \end{aligned}$$

$E(P)$

$$\hookrightarrow E(.75x - 1.50) = .75E(x) - 1.50$$

$$E(x) = \frac{0}{15} + \frac{2}{15} + \frac{4}{15} + \frac{9}{15} + \frac{16}{15} + \frac{15}{15}$$

$$= \frac{46}{15} \approx 3.07$$

$$\Rightarrow E(P) = .75(3.07) - 1.50 = \underline{\underline{\$.80}} = \underline{\underline{80 \text{ cents}}}$$