

6.1 Key

1.a) Each $P(x)$ is between 0 & 1 inclusively ✓

$$.12 + .20 + .31 + .25 + .12 = 1 \quad \sum P(x) = 1 \quad \checkmark$$

yes this is a probability distribution

1.b) mean

$$\mu = 0(.12) + 1(.2) + 2(.31) + 3(.25) + 4(.12) = 2.05 \text{ Customers}$$

$$\sigma_x = \sqrt{\sum x^2 P(x) - \mu^2} = \sqrt{0^2(.12) + 1^2(.2) + 2^2(.31) + 3^2(.25) + 4^2(.12) - 2.05^2}$$

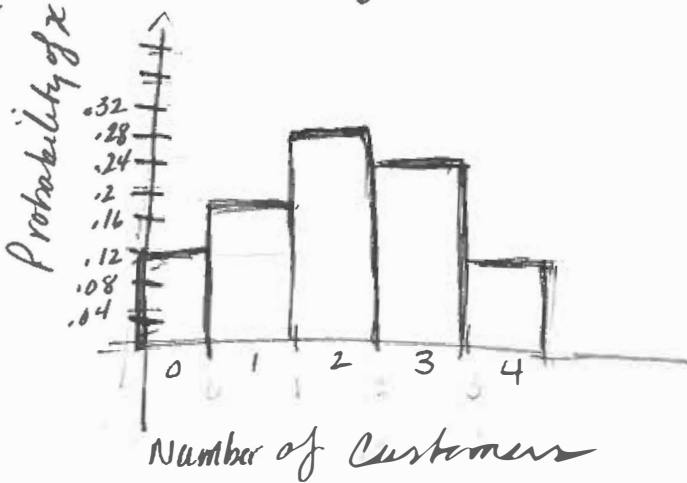
$$= \sqrt{5.61 - 4.2025} = \sqrt{1.4075} = 1.18638105$$

Variance: 1.41

Standard deviation = 1.19 customers

1.c

Probability of Customers in 15-min periods



ten thousand
10,000

2.

x	P(x)
200	0.999544
200 - 250,000	1 - .999544

x	P(x)
200	.999544
-249800	.000456

a) Expected value $200(.999544) + (-249800 \times .000456) = \86

b) We expect the insurance company to profit \$86 on average from each policy sold in the long run.

6.2 Key
 1a) $n=10$ $p=.65$ $1-p=.35$

$P(X) = {}_n C_x P^x (1-p)^{n-x}$

1a) $P(6) = {}_{10} C_6 (.65^6)(.35)^4 = 0.2377$

1b) $x = 4, 5, 6, 7, 8, 9, 10 \rightarrow$ Complement $x = 0, 1, 2, 3$

$P(0) = {}_{10} C_0 (.65^0)(.35)^{10} = .000027585$

$P(1) = {}_{10} C_1 (.65^1)(.35)^9 = .000512382$

$P(2) = {}_{10} C_2 (.65^2)(.35)^8 = .0004281378$

$P(3) = {}_{10} C_3 (.65^3)(.35)^7 = .021203015$

.02217104

$P(x > 3) = 1 - .02217104 = \boxed{0.9778}$

2. $n=15$ $p=.7$ $1-p=.3$

2a) $x = 10, 11, 12$

$P(10) = {}_{15} C_{10} (.7^{10})(.3)^5 = .206130381$

$P(11) = {}_{15} C_{11} (.7^{11})(.3)^4 = .218423131$

$P(12) = {}_{15} C_{12} (.7^{12})(.3)^3 = .170040213$

.0594793725

$P(10 \leq x \leq 12) = 0.5948$

2b) $x = 0, 1, 2, 3, \dots, 11 \rightarrow$ Complement $12, 13, 14, 15$

$P(12) = {}_{15} C_{12} (.7^{12})(.3)^3 = 0.170040213$

$P(13) = {}_{15} C_{13} (.7^{13})(.3)^2 = 0.091560115$

$P(14) = {}_{15} C_{14} (.7^{14})(.3)^1 = 0.030520038$

$P(15) = {}_{15} C_{15} (.7^{15})(.3)^0 = 0.004747562$

0.296867928

$P(x \leq 11) = 1 - 0.296867928$

$P(x \leq 11) = 0.7031$

3. $\mu = np = 400(.69) = 276$ adults wear sunglasses

$\sigma = \sqrt{np(1-p)} = \sqrt{400(.69)(.31)} = 9.24986 \approx 9.2$ adults wear sunglasses

$\sqrt{42.78} \approx 6.5$ adults