CEE110
Discussion Week 5

29.

a. $E(X) = \sum_{\text{all } x} xp(x)$ = 1(.05) + 2(.10) + 4(.35) + 8(.40) + 16(.10) = 6.45 GB.

b. $V(X) = \sum_{\text{all } x} (x - \mu)^2 p(x)$ = $(1 - 6.45)^2(.05) + (2 - 6.45)^2(.10) + \ldots + (16 - 6.45)^2(.10)$ = 15.6475.

c. $\sigma = \sqrt{V(X)} = \sqrt{15.6475}$ = 3.956 GB.

d. $E(X^2) = \sum_{\text{all } x} x^2 p(x)$ = $1^2(.05) + 2^2(.10) + 4^2(.35) + 8^2(.40) + 16^2(.10)$ = 57.25. Using the shortcut formula, $V(X) = E(X^2) - \mu^2 = 57.25 - (6.45)^2$ = 15.6475.

47.

a. $B(4;15,.7)$ = .001.

b. $b(4;15,.7) = B(4;15,.7) - B(3;15,.7)$ = .001 – .000 = .001.

c. Now p = .3 (multiple vehicles). $b(6;15,.3) = B(6;15,.3) - B(5;15,.3)$ = .869 – .722 = .147.

d. $P(2 \le X \le 4) = B(4;15,.7) - B(1;15,.7)$ = .001.

e. $P(2 \le X) = 1 - P(X \le 1) = 1 - B(1;15,.7)$ = 1 – .000 = 1.

f. The information that 11 accidents involved multiple vehicles is redundant (since n = 15 and x = 4). So, this is actually identical to **b**, and the answer is .001.

55. Let "success" correspond to a telephone that is submitted for service while under warranty and must be replaced. Then $p = P(\text{success}) = P(\text{replaced} \mid \text{submitted}) \cdot P(\text{submitted})$ = (.40)(.20) = .08. Thus X, the number among the company's 10 phones that must be replaced, has a binomial distribution with n = 10 and p = .08, so $P(X = 2) = \binom{10}{2}(.08)^2(.92)^8 = .1478$.