

1. Binomial random variable.

Note:  $X$ , number of questionable items, is binomial with  $n = 20$  and  $\pi = .10$ .

$$(a) P(X = 5) = P(X \leq 5) - P(X \leq 4) = .9887 - .9568 = .0319$$

$$(b) P(3 \leq X \leq 6) = P(X \leq 6) - P(X \leq 2) = .9976 - .6769 = .3207$$

$$(c) P(X = 20) = P(X \leq 20) - P(X \leq 19) = 1 - 1.000 = .0000$$

2. Probability.

$$P(\text{at least one smoker}) = 1 - P(\text{all non-smokers}) = 1 - (.63)^5 = .901$$

3. Normal random variable.

Note:  $X$ , density of lean body tissue, is normal with  $\mu = 1.10$  and  $\sigma = 0.02$ .

$$(a) P(X > 1.13) = P\left(\frac{X - \mu}{\sigma} > \frac{1.13 - 1.10}{0.02}\right) = P(Z > 1.50) \\ = 1 - P(Z \leq 1.50) = 1 - .9332 = .0668 \Rightarrow 6.68\%$$

$$(b) z = -0.67 \quad \therefore P(Z \leq -0.67) \approx .25$$

$$z = \frac{x - \mu}{\sigma}; -0.67 = \frac{x - 1.10}{0.02}; x = 1.10 + (-0.67)(0.02) = 1.087$$

4. Correlation and regression by calculator.

$$(a) \hat{y} = 72.920 + 0.094x$$

$$(b) r = .191$$

5. Probability.

$E$ : {family has more than one child}

$F$ : {family owns a minivan}

Note:  $P(E) = .55$ ;  $P(F) = .16$ ;  $P(E \cap F) = .13$

$$(a) P(F|E) = \frac{P(E \cap F)}{P(E)} = \frac{.13}{.55} = .236$$

$$(b) P(E \cup F) = P(E) + P(F) - P(E \cap F) = .55 + .16 - .13 = .580$$

$$(c) P(E \cap F) = .13 \text{ but } P(E)P(F) = (.55)(.16) = .088 \\ \Rightarrow \text{Two events are not independent.}$$

6. Correlation and regression by SPSS.

$$(a) s_e = 9.136$$

$$(b) \hat{y} = 47.874 + (-0.384)(30) = 36.4$$