

1. Normal random variable.

Note: X , octane level of gasoline, is normal with $\mu = 89.21$ and $\sigma = 0.17$.

$$(a) P(X < 89.5) = P\left(\frac{X - \mu}{\sigma} < \frac{89.5 - 89.21}{0.17}\right) = P(Z < 1.71) = .9564$$

$$(b) z = 0.52 \quad \therefore P(Z \leq 0.52) \approx .70$$

$$z = \frac{x - \mu}{\sigma}; 0.52 = \frac{x - 89.21}{0.17}; x = 89.21 + (0.52)(0.17) = 89.30$$

2. Correlation and regression by calculator.

$$(a) \hat{y} = 3.000 + 3.000x$$

$$(b) r = .626$$

3. Probability.

E_1 : {selected student is female}

F_1 : {selected student is self-supported}

E_2 : {selected student is male}

F_2 : {selected student is parent-supported}

F_3 : {selected student receives financial aid}

$$(a) P(E_1|F_3) = \frac{657}{657 + 654} = .501$$

$$(b) P(E_2 \cup F_2) = \frac{221 + 118 + 138 + 654}{1943} = .582$$

$$(c) P(F_1) = \frac{155 + 118}{1943} = .141 \Rightarrow (.141)^2 = .020$$

$$(d) P(E_2 \cap F_3) = \frac{654}{1943} = .337 \text{ but}$$

$$P(E_2)P(F_3) = \frac{118 + 138 + 654}{1943} \cdot \frac{657 + 645}{1943} = .316$$

\Rightarrow Two events are not independent.

4. Binomial random variable.

Note: X , number of lefthanded children, is binomial with $n = 13$ and $\pi = .20$.

$$(a) P(X < 3) = P(X \leq 2) = .5017$$

$$(b) P(6 \leq X \leq 9) = P(X \leq 9) - P(X \leq 5) = 1.000 - .9700 = .0300$$

(c) "More than 5 righthanded" means "less than or equal to 7 lefthanded."

$$\Rightarrow P(X \leq 7) = .9988$$

Alternatively, let Y be number of righthanded children. Then,

Y is binomial with $n = 13$ and $\pi = .80$.

$$\Rightarrow P(Y > 5) = 1 - P(Y \leq 5) = 1 - .0012 = .9988$$

5. Correlation and regression by SPSS.

$$(a) \hat{y} = 308.354 + (0.124)(425) = 361.05$$

(b) $r^2 = .008$. Approximately 0.8% of the variability in the data is accounted for by the linear relationship between Fall 2005 and Spring 2006 expenditures.