Math 220: Elementary Statistics — Kane Nashimoto
Exam 2 Solutions
Spring 2007

1. Correlation and regression by calculator.

   (a) $\hat{y} = 2.396 + 0.579\,x$
   (b) $r = .672$

2. Binomial random variable.

   Note: X, number of heads, is binomial with $n = 25$ and $\pi = .60$.

   (a) $P(10 \leq X \leq 15) = P(X \leq 15) - P(X \leq 9) = .5754 - .0132 = .5622$
   (b) $P(X > 20) = 1 - P(X \leq 20) = 1 - .9905 = .0095$

3. Probability.

   E: {Student you met is from Missouri}
   F: {Student you met lives on campus}
   Note: $P(E) = .70$; $P(F) = .60$; $P(E \cap F) = .40$

   (a) $P(E \cup F) = P(E) + P(F) - P(E \cap F) = .70 + .60 - .40 = .90$
   (b) $P(F|E) = \dfrac{P(E \cap F)}{P(E)} = \dfrac{.40}{.70} = .571$
   (c) $P(E \cap F) = .40$ but $P(E)P(F) = (.70)(.60) = .420$
   $\Rightarrow$ Two events are not independent.

4. Normal random variable.

   Note: X, octane rating, is normal with $\mu = 87.0$ and $\sigma = 0.4$.

   (a) $P(X > 87.6) = P\left(\dfrac{X - \mu}{\sigma} > \dfrac{87.6 - 87.0}{0.4}\right) = P(Z > 1.50)$
   $= 1 - P(Z \leq 1.50) = 1 - .9332 = .0668$
   (b) $z = -0.44 \because P(Z \leq -0.44) = .33$
   $z = \dfrac{x - \mu}{\sigma}$; $-0.44 = \dfrac{x - 87.0}{0.4}$; $x = 87.0 + (-0.44)(0.4) = 86.82$

5. Probability.

   (a) $P(\text{boy}) = .50$
   (b) $P(\text{at least one boy}) = 1 - P(\text{all girls}) = 1 - (.50)^4 = .9375$

6. Correlation and regression by SPSS.

   (a) $\hat{y} = -130.143 + (4.258)(70.0) = 167.92$
   (b) $r^2 = .481$
   (c) No discernable pattern is seen in the residual plot. Thus, the regression model fits the data well.