Math 220 : Elementary Statistics — Kane Nashimoto

Exam 2 Solutions

Spring 2009

1. Normal random variable.

   Note : X, cumulative grade point average, is normal with $\mu = 2.86$ and $\sigma = 0.39$.

   (a) $P(X > 3.50) = P\left(\frac{X-\mu}{\sigma} > \frac{3.50 - 2.86}{0.39}\right) = P(Z > 1.64)$
   $= 1 - P(Z \leq 1.64) = 1 - .9495 = .0505$

   (b) $z = -1.04 \because P(Z \leq -1.04) \approx .15$
   $z = \frac{x - \mu}{\sigma}$; $-1.04 = \frac{x - 2.86}{0.39}$; $x = 2.86 + (-1.04)(0.39) = 2.45$

2. Contingency table.

   (a) Conditional percentages are as follows.

	Gene	
Gender	Present	Absent
Men	1.00	99.00
Women	1.45	98.55

   (b) Proportionately, more women than men possess the gene.

3. Probability.

   A : {Selected household has at lease one child}
   B : {Selected household has total income of $70,000 or more}

   Note : $P(A) = .57$; $P(B) = .34$; $P(A \cap B) = .14$

   (a) $P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{.14}{.57} = .246$

   (b) $P(A \cup B) = P(A) + P(B) - P(A \cap B) = .57 + .34 - .14 = .770$

   (c) $P(A \cap B) = .14$ but $P(A)P(B) = (.57)(.34) = .194$
   $\Rightarrow$ Two events are not independent.

4. Binomial random variable.

   Note : X, number of times the ball goes into the basket, is binomial with $n = 15$ and $p = .70$.

   (a) $\mu = np = (15)(.70) = 10.5$

   (b) $P(X \geq 10) = 1 - P(X \leq 9) = 1 - .2784 = .7216$

   (c) $P(6 < X < 12) = P(X \leq 11) - P(X \leq 6) = .7031 - .0152 = .6879$

5. Probability.

   $P(\text{at least one speeding}) = 1 - P(\text{all not speeding}) = 1 - (.86)^5 = .530$

6. Correlation and regression by calculator.

   (a) $r = .775$
   $\hat{y} = 0 + 0.775\,x$

   (b) Note: $\bar{x} = \bar{y} = 0$; $s_x = s_y = 1$
   $b = r\left(\frac{s_y}{s_x}\right) = .775\left(\frac{1}{1}\right) = 0.775$
   $a = \bar{y} - b\,\bar{x} = 0 - (0.775)(0) = 0$

7. Correlation and regression by SPSS.

   (a) $\hat{y} = -19.182 + 1.227(21) = 6.585$

   (b) $r^2 = .266 \;\Rightarrow$ Approximately 27% of the variability in the data is accounted for by the regression model.