

1. Binomial random variable.

Note: X , number of adults with myopia, is binomial with $n = 20$ and $\pi = .30$.

(a) $P(X \leq 6) = .6080$

(b) $P(X > 12) = 1 - P(X \leq 12) = 1 - .9987 = .0013$

(c) $P(X = 10) = P(X \leq 10) - P(X \leq 9) = .9829 - .9520 = .0309$

2. Probability.

E : {having electrical problem}

F : {having mechanical problem}

Note: $P(E) = .57$; $P(F) = .31$; $P(E \cap F) = .08$

(a) $P(E \cup F) = P(E) + P(F) - P(E \cap F) = .57 + .31 - .08 = .800$

(b) $P(E|F) = \frac{P(E \cap F)}{P(F)} = \frac{.08}{.31} = .258$

(c) $P(E \cap F) = .08$ but $P(E)P(F) = (.57)(.31) = .177$
 \Rightarrow Two events are not independent.

3. Correlation and regression by calculator.

(a) $\hat{y} = 3.879 + 0.182x$

(b) $r = .234$

4. Normal random variable.

Note: X , scale reading, is normal with $\mu = 50.00$ and $\sigma = 0.02$.

(a) $P(X > 50.03) = P\left(\frac{X - \mu}{\sigma} > \frac{50.03 - 50.00}{0.02}\right) = P(Z > 1.50)$
 $= 1 - P(Z \leq 1.50) = 1 - .9332 = .0668 \Rightarrow 6.68\%$

(b) $z = -0.84 \therefore P(Z \leq -0.84) \approx .20$

$$z = \frac{x - \mu}{\sigma}; -0.84 = \frac{x - 50.00}{0.02}; x = 50.00 + (-0.84)(0.02) = 49.98$$

5. Correlation and regression by SPSS.

(a) Because the coefficient of determination is large ($r^2 = .883$), we will be reasonably confident in the accuracy of our prediction.

(b) Note that X and Y have a negative relationship ($b = -0.034$).
 $r = -\sqrt{r^2} = -\sqrt{.883} = -.940$