

1. Contingency table.

- (a) Conditional proportions are as follows.

Affiliation	Income	
	High	Low
Democrat	.405	.595
Republican	.500	.500

More Republicans than Democrats earn high incomes.

- (b) There is no association between political affiliation and income in either table.
(c) People with advanced degrees tend to earn high incomes, and more Republicans than Democrats hold advanced degrees.

2. Probability.

A : {selected person uses treadmill}

B : {selected person uses weightlifting equipment}

Note: $P(A) = .70$; $P(B) = .40$; $P(A \cap B) = .30$

- (a) $P(A \cup B) = P(A) + P(B) - P(A \cap B) = .70 + .40 - .30 = .80$
(b) $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{.30}{.40} = .75$
(c) $P(A \cap B) = .30$ but $P(A)P(B) = (.70)(.40) = .28$
 \Rightarrow Two events are not independent.

3. Binomial random variable.

- (a) X , number of red lights, is binomial with $n = 9$ and $p = .60$.
(b) $P(X < 4) = P(X \leq 3) = .0994$
(c) $P(X > 5) = 1 - P(X \leq 5) = 1 - .5174 = .4826$
(d) $P(X = 7) = P(X \leq 7) - P(X \leq 6) = .9295 - .7682 = .1613$

4. Correlation and regression by calculator.

- (a) $r = .559$
(b) $\hat{y} = 2.139 + 0.589x$

5. Normal random variable.

Note: X , price of gasoline, is normal with $\mu = 272$ and $\sigma = 11$.

$$\begin{aligned} \text{(a) } P(X > 286) &= P\left(\frac{X - \mu}{\sigma} > \frac{286 - 272}{11}\right) = P(Z > 1.27) \\ &= 1 - P(Z \leq 1.27) = 1 - .8980 = .1020 \end{aligned}$$

$$\text{(b) } z = -0.25 \text{ because } P(Z \leq -0.25) \approx .40$$

$$z = \frac{x - \mu}{\sigma}; -0.25 = \frac{x - 272}{11}; x = 272 + (-0.25)(11) = 269.25$$

6. Correlation and regression by SPSS.

$$\text{(a) } \hat{y} = 123.718 + 0.249(40) = 133.68$$

$$\text{(b) } r^2 = .237 \Rightarrow \text{Approximately 24\% of the variability in the data is accounted for by the regression model.}$$