

STAT 211 – Spring 2007 Exam 1 Answer Key

1. a. $P(X \geq 1) = P(X > 0) = 1 - 0.77 = 0.23$
- b. $P(X \leq 10) = P(X < 50) = 1 - 0.004 - 0.001 = 0.995$
- c. $\mu = \mu_x = E[X] = (0)(0.77) + (1)(0.15) + (2)(0.05) + (10)(0.025) + (50)(0.004) + (100)(0.001) = 0.80$
- d. $E[X^2] = (0)^2(0.77) + (1)^2(0.15) + (2)^2(0.05) + (10)^2(0.025) + (50)^2(0.004) + (100)^2(0.001) = 22.85$
 $V[X] = \sigma^2 = \sigma_x^2 = E[X^2] - (E[X])^2 = 22.85 - (0.80)^2 = 22.85 - 0.64 = 22.21$
 $\sigma = \sqrt{\sigma^2} = \sqrt{22.21} = 4.7127$
- e. $E[X - 1] = E[X] - 1 = 0.8 - 1 = -0.20$

2. a. $\bar{x} = \frac{\sum x_i}{n} = \frac{92}{8} = 11.5$

b. Ordered data: 5, 6, 6, 8, 9, 17, 17, 24 median = $\frac{8+9}{2} = 8.5$

c. modes = 6, 17

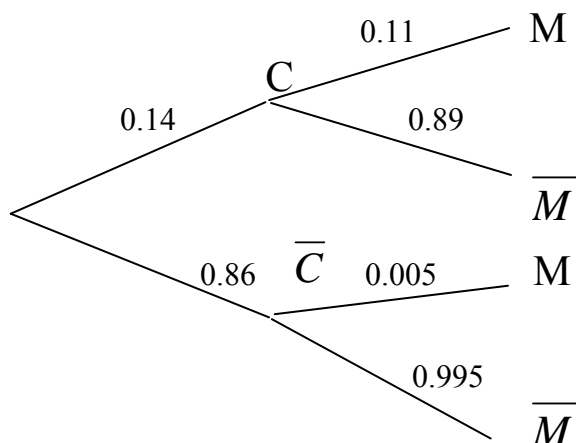
d. range = 24 - 5 = 19

e.

x_i	$(x_i - \bar{x})$	$(x_i - \bar{x})^2$	x_i	x_i^2
5	$5 - 11.5 = -6.5$	$(-6.5)^2 = 42.25$	5	$(5)^2 = 25$
6	$6 - 11.5 = -5.5$	$(-5.5)^2 = 30.25$	6	$(6)^2 = 36$
6	$6 - 11.5 = -5.5$	$(-5.5)^2 = 30.25$	6	$(6)^2 = 36$
8	$8 - 11.5 = -3.5$	$(-3.5)^2 = 12.25$	8	$(8)^2 = 64$
9	$9 - 11.5 = -2.5$	$(-2.5)^2 = 6.25$	9	$(9)^2 = 81$
17	$17 - 11.5 = 5.5$	$(5.5)^2 = 30.25$	17	$(17)^2 = 289$
17	$17 - 11.5 = 5.5$	$(5.5)^2 = 30.25$	17	$(17)^2 = 289$
24	$24 - 11.5 = 12.5$	$(12.5)^2 = 156.25$	24	$(24)^2 = 576$
$\Sigma x_i = 92$	$\Sigma(x_i - 11.5) = 0$	$\Sigma(x_i - 11.5)^2 = 338$	$\Sigma x_i = 92$	$\Sigma x_i^2 = 1396$

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} = \frac{338}{7} = 48.2857 \quad \text{OR} \quad S^2 = \frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1} = \frac{1396 - \frac{(92)^2}{8}}{7} = \frac{1396 - 1058}{7} = \frac{338}{7} = 48.2857$$

3. a.



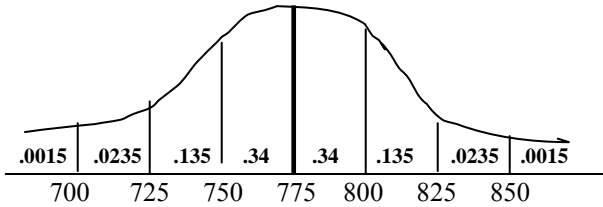
<u>Simple Events</u>	<u>Joint Probabilities</u>
C and M	$(0.14)(0.11) = 0.0154$
C and \bar{M}	$(0.14)(0.89) = 0.1246$
\bar{C} and M	$(0.86)(0.005) = 0.0043$
\bar{C} and \bar{M}	$(0.86)(0.995) = 0.8557$

b. $P(\overline{C} \text{ and } \overline{M}) = P(\overline{C \text{ or } M}) = 0.8557$

c. $P(\overline{M}) = P(C \text{ and } \overline{M}) + P(\overline{C} \text{ and } \overline{M}) = 0.1246 + 0.8557 = 0.9803$

d. $P(\overline{C}|M) = \frac{P(\overline{C} \text{ and } M)}{P(M)} = \frac{P(\overline{C} \text{ and } M)}{1 - P(\overline{M})} = \frac{0.0043}{(1 - 0.9803)} = 0.2183$

4. a. $13.5\% + 34\% + 34\% = \text{ABOUT } 81.5\% \text{ OR } \approx 0.815$ b. $(0.0015 + 0.0235) * 365 = 0.025 * 365 = \text{ABOUT } 9.125$



5. a. $E[0.62X + 73,000] = 0.62E[X] + 73,000 = 0.62(800,000) + 73,000 = 569,000$

b. $V[0.62X + 73,000] = (0.62)^2 * V[X] = (0.3844)(5,000)^2 = 9,610,000$

6. a. $P(D) = \frac{460}{2298}$ b. $P(N \text{ and } Y) = \frac{551}{2298}$ c. $P(Y \text{ or } \overline{N}) = 1 - \frac{399}{2298} = \frac{1899}{2298}$

d. $P(Y|R) = \frac{P(Y \text{ and } R)}{P(R)} = \frac{143/2298}{433/2298} = \frac{143}{433}$

7. a. $P(B|H) = \frac{P(B \text{ and } H)}{P(H)} = \frac{0.13}{0.25} = 0.52$

b. $P(\overline{B} | H) = 1 - P(B|H) = 1 - 0.52 = 0.48$

8. a. $P(M \text{ or } E) = P(M) + P(E) - P(M \text{ and } E) = 0.043 + 0.024 - (0.043 * 0.024) = 0.066$

b. $P(\overline{M \text{ or } E}) = 1 - P(M \text{ or } E) = 1 - 0.066 = 0.934$

OR

$P(\overline{M} \text{ and } \overline{E}) = P(\overline{M})P(\overline{E}) = (1-0.043)(1-0.024) = (0.957)(0.976) = 0.934$

c. $P(M|E) = 0.043$

9. ____ d ____ Descriptive statistics ____ a ____ Parameter ____ f ____ Sample

10. b. continuous random variable

11. b. FALSE

12. a. (iii) stay the same b. (ii) decrease

13. a.

14. a. qualitative