

No Calculator Middleton High School Invitational
- February 18, 2006 - Statistics Competition

SOLUTIONS FOR STATISTICS

1. Answer must lie between 2.4 and 2.96. Therefore, the answer is **D**.
2. $r \frac{s_y}{s_x} = m = 0.5(2) = 1$; Therefore, $y = x + b$; $2 = 2 + b$; $b = 0$. $1^2 + 0^2 = 1$ **D**.
3. Since the variables aren't disjoint,

$$P(U \text{ or } F) = p(U) + p(F) - p(U \text{ and } F) = \frac{4}{9} \text{ C}$$

4. The table below shows the possible outcomes in summing up the two die. From counting the bold lettered numbers, we can see that 21/36 or 7/12, of the outcomes result in a sum of 7 or greater. Therefore **B**.

2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10
6	7	8	9	10	11
7	8	9	10	11	12

5. $\frac{20 \times 16}{8} = 40 = n$ **D**.
6. Definition of Binomial Distribution. **A**.
7. The complement of an answer is equal to 1 subtract the answer, which is equal to:
 $1 - \left(\frac{7}{43} \times \frac{4}{42} \right)$ **D**.
8. Correlation coefficient is not affect by addition and multiplication. Therefore, the correlation coefficient remains the same. **A**.
9. $p(\text{passing the AP Stat exam and passing the AP class}) = 3/25 \times 2/5 = 6/125$

$$p(\text{passing the AP class} | \text{passing the AP Stat exam}) = \frac{p(\text{passing the AP Stat exam and passing the AP class})}{p(\text{passing the AP Stat exam})} = \frac{\frac{6}{125}}{\frac{1}{5}} = \frac{6}{25} \text{ D.}$$

10. $\frac{12.25 - 11}{1.5} = 0.83$ **C**.
11. Definition of Type II error. **C**.
12. $1 - \frac{25}{30} = \frac{1}{6}$ **A**.
13. $p(x > 5) = \left(1 - \frac{1}{5} \right)^5 = \frac{4^5}{5^5}$ **D**.
14. $p(x = 5) = \left(1 - \frac{1}{5} \right)^4 \times \frac{1}{5} = \frac{4^4}{5^5}$ **C**.
15. $(5C4) x \left(\frac{1}{5} \right)^4 \left(\frac{4}{5} \right)^1 = \frac{4}{5^4}$ **A**.
16. Chi-Squared is always skewed to the right. **A**.

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17. The mean is equal to $3.1 + 2.9 = 6$. Since the two variables are not independent, the standard deviation is equal to $\sigma_{J+U}^2 = 3^2 + 4^2 + 2(1)(3)(4)$. $\sigma_{J+U} = 7$. **D.**
18. $Z^* \left(\frac{\sigma_x}{\sqrt{n}} \right) = 2 \left(\frac{1.5}{\sqrt{n}} \right) = \pm 1, n = 9$ **D.**
19. Definition of marginal distribution. $\frac{\text{sumof "yes"}}{\text{overalltotal}} = \frac{126}{400} = \frac{63}{200}$ **D.**
20. The expected value is equal to $\frac{\text{rowtotal} \times \text{columntotal}}{\text{tabletotal}}$ which yields $137/2$. **B.**
21. $\frac{44}{76 + 44 + 90 + 64} = \frac{22}{137}$ **B.**
22. Degrees of freedom is equal to $(r-1)(c-1) = (2-1)(4-1) = 3$ **A.**
23. If P and G are independent, $p(P|G) = p(P) = 0.2$ **B.**
24. $((0.64 \times 8) - 0.96 - 0.89) / 6 = 3.27 / 6 = 0.545 = 55\%$ **D.**
25. Definition of power. **A.**
26. Definition of a confidence interval. **D.**
27. II, III, IV, V, and VI are the only ones that will yield a result in the interval $[0, \infty)$. **D.**
28. If we rewrite the equal to where we solve for Y, we can conclude that D. is the correct answer. **D.**
29. $100(0.01) + 20(0.05) - 1(0.5) - 5(0.44) = -.7$ **B.**
30. Definition of significance level. **A.**