FAMAT State Statistics Solutions 2002

1. E SAT Math and verbal are not independent.

2. D $\frac{n}{35}=\frac{52}{10}, n=182$

3. C Need highest n such that $1-\left(\frac{364}{365}\right)\left(\frac{363}{365}\right)...\left(\frac{366-n}{365}\right)\geq 0.75, n=32$

4. C $t^*=2.776, \bar{x}\pm 21.8, s=6.140, n=5, CI=\bar{x}\pm t^*\frac{s}{\sqrt{n}}=21.8\pm 7.623$

5. D

6. A $\hat{p}=0.173, CI=\hat{p}\pm\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}=0.173\pm 0.042$

7. A P (type I error) $=\alpha=0.05$

8. E Find power against u=301 sec. Test rejects H_o when $z=\frac{\bar{X}-264}{72/\sqrt{6}}\geq 1.645$ or $\bar{X}\geq 312.353$. Power against u=301 is P $(\bar{X}\geq 312.353 \mid u=301)$ or p$\left(\frac{\bar{X}-301}{72/\sqrt{6}}\geq\frac{312.353-301}{72/\sqrt{6}}\right)=P(z\geq 0.39)$ which is 0.3483.

   P(Type II error)=1-power=0.6517

9. C P(red)=$\frac{5}{12}$, P(green)=$\frac{3}{11}$, P(red and green)=$\frac{5}{12}\bullet\frac{3}{11}=0.114$

10. A

11. B z=0.675=$\frac{2.8-2.5}{\sigma}, \sigma=0.74$

12. D median and IQR resistant to outliers

13. C Obviously ne gets 80 pts from pure knowledge. For the remaining questions, $\frac{1}{3}\bullet\frac{30-3.5}{4}=2.208$ are B. (2.208)(4)=8.883 additional points. 10-2.208=7.792 of the 10 are not B and are subtracted. 80+8.833-7.792=81.042. Note that this particular solution did not account for rounding error.

14. C P(he gets a hit in a game)=1-(1-0.381)^4=0.853, so P(not in game)=0.147. Mean number of games it takes for this to occur is $\frac{1}{0.147}$=6.8 or 7 games. this means he hits safely in 6 games, then goes a game without a hit.

15. A $[1-(1-0.381)]^{56}=1.376\bullet 10^{-4}$

16. A $1-\binom{10}{3}(0.5)^{10}-\binom{10}{2}(0.5)^{10}-\binom{10}{1}(0.5)^{10}-\binom{10}{0}(0.5)^{10}=0.828$

17. C Using a Venn diagram , in the intersection of the 2 circles is 0.15, in the stat circle only is 0.045, in the NHS circle only is 0.141. P(not stat|NHS)=0.904

18. D Both statisticians could be correct if Simpson's Paradox holds

19. A For example, the first and 2nd mailgoers can't be in the same group

20. D CI= $\hat{p}n-\hat{p}B\pm Z^*\sqrt{\frac{\hat{p}B(1-\hat{p}B)}{n_B}+\frac{\hat{p}n(1-\hat{p}n)}{n_n}}, Z^*=1.96=0.084\pm 0.060$

21. D MOE= $Z^* \frac{\sigma}{\sqrt{n}}, n\alpha(MOE)^{-2}$
22. B Score on this test, 100m dash time, processing speed, age in months, # of quantitative variables are quantitative variables
23. C The mean should divide the area under the graph in half; this is most nearly C. The median should be between the peak (A) , and the mean, so the median is B.
24. $C\ a = r\frac{sy}{sx}, r = \frac{2}{3}$
25. B $P(x \mid y) = \frac{P(X \wedge Y)}{P(Y)}, P(Y \mid X) = \frac{P(X \wedge Y)}{P(X)}, P(Y \mid X) = \frac{P(Y)}{P(X)} - 0.320$
26. D $x^2 = \sum \frac{(O-E)^2}{E} = 3.024$
27. E r measures association, not causation
28. D All
29. A Only I is true
30. A None of these transformations will change r