Statistics Test Mississippi 2002

1) $N(200, 20)$ $\quad P(X < k) = .975$

$$P\left(\frac{X-\bar{X}}{s} < \frac{k-\bar{X}}{s}\right) = .975$$

$$P\left(Z < \frac{k-200}{20}\right) = .975$$

$Z = 1.9599$

$1.9599 < \frac{k-200}{20}$

$39.199 < k - 200$

$239.20 < k$

(A)

2) Standard deviation is the average of the distances of each observation from the mean.
as the distances from the mean increase the standard deviation increase
(C)

3) $\hat{y} = mx + 3$

$4 = m(2) + 3$

$2 = m$

(D)

$\hat{y} = 2x + 3$

$(\bar{x}, \bar{y}) \Rightarrow \bar{y} = 2\bar{x} + 3$ is a pt of the regression line

4) $P(X > 75) = .30$

$P\left(\frac{X-\bar{X}}{s} > \frac{75-\bar{X}}{s}\right) = .30$

$P\left(Z > \frac{75-\bar{X}}{14}\right) = .30$

$Z = .5244$

$.5244 > \frac{75-\bar{X}}{14}$

$67.658 < \bar{X}$

(B)

5) BASIC PRINCIPLES of Experiments are CONTROL, REPLICATION & RANDOMIZATION on the subjects.
BLOCKING is DESIGN of an experiment
(D)

6) $Z_1 = \frac{\bar{X} - X_1}{s}$ and $Z_2 = \frac{78 - X_2}{12}$

$Z_1 = \frac{89-81}{8}$

$Z_1 = 1$

$1 = \frac{78 - X_2}{12}$

$12 = 78 - X_2$

$-66 = -X_2$

$66 = X$

(C)

7) $(\bar{X}_F - \bar{X}_m) \pm m$

$(69-64) \pm Z^*(1.17)$

$5 \pm 1.64\,(1.17)$

5 ± 1.92

(C)

8) $m = Z^* \cdot \frac{s}{\sqrt{n}}$

$.6 = \frac{2.5758(2.4)}{\sqrt{n}}$

$\sqrt{n} = 10.30$

$n = 106.158 \Rightarrow n = 107$

(C)

9) First showed 58%
Second showed 13%
because of response bias due to the wording of the question (E)

10) $\log y = .019x + 0.839$

$10^{0.19x + 0.839} = y$

if $x = 2$ then $y = 10^{0.19(2) + 0.839} \approx 16.557$

(C)

11) Binomial distribution

$P(x \geq 105) = 1 - P(x \leq 104)$

$n = 300$, $p = .30$

$= 1 - \text{bincdf}(300, .3, 104)$

$= .035$ (B)

12) (E)

	AP	NON AP
sampling	20	21
median	33	33
mean	33.4	30.57
range	18	20
StandDev	5.63	6.7

13) (D)

14) $n = 20$, $\bar{x} = 218$, $S_x = 11$, $df = 19$, $t^* = 1.727$

$CI \Rightarrow 218 \pm 1.727\left(\frac{11}{\sqrt{20}}\right)$

218 ± 4.25

(D)

15) $S_x^2 = \frac{\Sigma(x-\bar{x})^2}{n-1} = \frac{90}{n-1}$

if $N = 10$ $\quad S_x^2 = \frac{90}{10-1}$

$S_x^2 = 10$

$S_x = \sqrt{10}$

(B)

16)

	LAWYER	DOCTOR	CORPEX	OTHER	TOTAL
OBS	110	140	250	125	625
EXP	125 $.20(625)$	156.25 $.25(625)$	218.75 $.35(625)$	125 $.20(625$	

$\chi^2 = \Sigma \frac{(O-E)^2}{E} = 7.9542$ $\quad df = 4 - 1 = 3$

$P(\chi^2 > 7.9542) = .0469 \Rightarrow$ accept H_0 at $\alpha = .01$

$\Rightarrow$ does not change distribution is rotated (C)

17) Will go to the committee if 18 persons say yes.

Geometric prob with 18th

$p = .15$, $n = 100$ $\quad .00946$ (E)

18) $\frac{83}{239} \pm 2.576(.0306)$

$.347 \pm .079$ (C)

19) $P(X=1, y=1) = .025$

$P(X=1) = .1$ $\quad P(y=1) = y$

$.025 = .1(y)$

$.25 = y$

$P(y=1) = .25$

$P(x=3, y=3) = .08$

$P(x=3) = x$ $\quad P(y=3) = .2$

$.2x = .08$

$x = .4$

$P(x=3) = .4$

$\Sigma P(x) = 1 = .1 + .4 + .5$

$\Sigma P(y) = 1 = .25 + .55 + .2$

$P(x=2, y=2)$

$= P(x=2)\,P(y=2)$

$= .5(.55) = .275$

(B)

20) $\mu_{x+y} = \mu_x + \mu_y = 32 + 44 = 76$

$\sigma_{x+y} = \sqrt{\sigma_{x+y}^2} = \sqrt{\sigma_x^2 + \sigma_y^2} = \sqrt{5^2 + 12^2} = 13$

(B)

21) company I $\quad P(x > 60)$

$P\left(z > \frac{60-50}{10}\right)$

$P(z > 1)$

$=$ same

company II $\quad P(y > 60)$

$P\left(z > \frac{60-55}{5}\right)$

$P(z > 1) = .1586$

$15.86\% \Rightarrow 15.9\%$ (C)

22) confidence interval defines the sample% of the populations that falls within margin of error which from the true percentage of the population thus the margin of error is the difference between sample% & pop%

(D)

23) t-test $P(t > 2.13) = P\text{value} = .0426$ (C)
$H_0: \mu \leq 5$
$H_a: \mu > 5$
$df = 6-1 = 5$

24) WHEN THE STANDARD DEVIATION OF A POPULATION IS UNKNOWN A t-TEST IS USED. (A)

25)

WIN	\$20 − \$3 = \$17	\$5 − \$3 = \$2	− \$3
P(WIN)	2/36 (roll 2 or 12)	4/36 (roll 7)	28/36

EXPECTED VALUE $= 17\left(\frac{2}{36}\right) + 2\left(\frac{4}{36}\right) + -3\left(\frac{28}{36}\right) = -1.05$ (A)
LOSE \$1.05 on the average each time you play

26) NONE FOR JOE * NONE FOR MATTHEW
.50 * .25 = .125 (B)

27) $\hat{y} = 1.3 + 0.73x$
if $x = 4$ then $\hat{y} = 1.3 + 0.73(4) = 4.22$
RESIDUAL = OBSERVED − PREDICTED
= 7 − 4.22
= 2.78 (A)

28)

	EVE	DAY	TOTAL
< 25	400	850	1250
25-30	475	750	1225
> 31	560	300	860
	1435	1900	3335

EXPECTED 30 EVE $= \frac{(1435)(860)}{3335} = 370.04$
(A) 370

29) $n = 1600$
$\hat{p} = .10$ NOT owning a car
$s_x = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{.10(.90)}{1600}} = .0075$ (B)

$P(.09 < \hat{p} < .11) = P\left(\frac{.09-.10}{.0075} < z < \frac{.11-.10}{.0075}\right)$
$= P(-1.33 < z < 1.33)$
$= .817577$

30) I) $y = .9797x + -0.1623$ ⇒ NOT $y = -0.1623x + .9797$
↑ constant

II) R-Sq = 85.0% R^2 = Variation in Coll GPA explained by LSR line

III) Pvalue = .001 ⇒ .001 < .05 ⇒ Reject H_0 ⇒ Significant relationship

(C) II, III are true