STAT 301 REVIEW FOR EXAM 2 – ANSWERS:

1. a and d
2. a
3. c
4. e

5. B, *F*, Test
6. A, *z*, CI
7. D, *F*, Test
8. A, *t*, Test
9. C, *t*, Test
10. E, *t*, CI
11. D, *F*, Test
12. C, *t*, CI
13. A, *t*, CI
14. A, *z*, Test

15. a. Yes, $n>15$, so t-test is fine unless you have strong skewness or outliers of which we have none. We do not know the population standard deviation.
    b. $H_0 : \mu = 200$
       $H_a : \mu > 200$
    c. $t = 11.119$, P-value = 0, df = 15
    d. Reject H_0, and conclude that there is enough evidence to show that the high risk group's population average cholesterol level is significantly higher than 200 mg/dl.
    e. (233.65, 249.60)
    f. (230.63, 252.66)

16. a. (1.285, 4.840)
    b. H_0: $\mu_{diff} = 0$ where diff = before - after
       H_0: $\mu_{diff} > 0$
       t = 3.672
       p-value = 0.002/2 = 0.001
       Reject H_0 and conclude that there is enough evidence to show that the medication significantly improves (lowers) cholesterol levels in the population.
    c. No, because you can only use a CI to test two-sided significance tests.

17. a. $H_0 : \mu_1 = \mu_2$
       $H_a : \mu_1 \neq \mu_2$
    b. $t = 4.069$ and P-value = 0.001

c. Reject H_0, there is enough evidence to conclude that there is a significant difference in the population average weights of the combs of roosters fed two different vitamin supplement diets.

d. (9.25955, 56.02616)

18. a. Matched pairs.

b. $H_0 : \mu_{y-x} = 0$ versus $H_a : \mu_{y-x} > 0$ (Also ok to use μ_{diff} with diff = y – x, but not ok to use $\mu_y = \mu_x$.)

c. $t = 2.378$

d. $t = \dfrac{\bar{x}_D - 0}{s_D / \sqrt{n}} = \dfrac{.85}{1.5852/\sqrt{20}}$

e. 0.014

f. Reject H_0, there is enough evidence to show that the new breakfast drink tastes significantly better than the old breakfast drink on average in the population.

19. a. $H_0 : \mu = 10.6$

$H_0 : \mu > 10.6$

b. $Z = 2.00$

c. P-value = .0228

d. Fail to reject H_0 at alpha = 0.01 level. There is not enough evidence to show that the new fertilizer produces a population mean yield significantly above 10.6 bushels/acre.

e. Picture.

20. a. (59.21, 64.37)

b. 2.578

c. $H_0 : \mu = 61.3$

$H_a : \mu \neq 61.3$

Since 61.3 is in the confidence interval, you fail to reject H_0 and conclude that there is not enough evidence to show that the population mean weight of male runners is significantly different from 61.3.

21. a. There is a significant difference between the distance the 2005 titanium and the other two drivers can hit.

b. (7.689)2 > 10.799, so yes.

c. 9.71

d. 0.7256

e. $H_0 : \mu_1 = \mu_2 = \mu_3$

$H_a :$ at least one μ_i is different

F = 43.626, P-value = 0

Reject H_0, at least one driver has a different population mean from the others.

f. No, you need Bonferroni's procedure. Bonferroni's procedure found a significant difference between the 2005 titanium and the other two drivers. The steel and the persimmon drivers are not significantly different.

22. a. The driver type affects distance since none of the lines are horizontal; the ball type affects distance since all of the lines are not on top of each other; and the interaction is significant since the lines are not parallel.
    b. The main effects of driver and ball are significant and interaction is significant to population mean drive distance.

23. C
24. B
25. D
26. D
27. B
28. A
29. D

30. a. (2)
    b. (4)
    c. (2)

31. C
32. C
33. Picture with 2 tails shaded with the total representing the P-value, lines drawn at t = -3.138 and t = +3.138.
34. D
35. E
36. Picture with line drawn at t = +3.138, whole curve to the left of this line is shaded, representing the P-value.
37. B
38. D, 2 independent groups with 1 quantitative variable
39. C, 1 sample with everybody tested twice (before and after)
40. A, 1 quantitative variable from 1 sample, population standard deviation known
41. B, 1 quantitative variable from 1 sample, population standard deviation unknown
42. E, more than 2 independent groups (divided up one way, by race), 1 quantitative measurement
43. F, 2 categorical ways of dividing up the subjects (race and weight gain), 1 quantitative measurement.