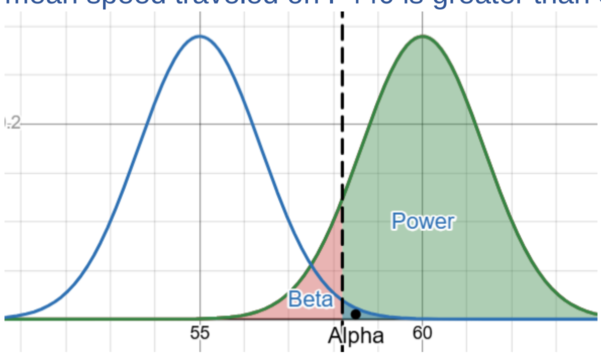
ST370 Exam 2 Review Key

1. a and d
2. a
3. c
4. e
5. C, t, Test
6. A, z, CI
7. D, z, Test
8. A, t, Test or CI since it is double sided and a CI can be used to do a significance test.
9. C, t, Test
10. E, t, CI
11. B, z, Test or CI since it is double sided and a CI can be used to do a significance test.
12. C, t, CI
13. A, t, CI
14. A, z, Test
15. B
16.
    a. (15.84, 16.00) or (15.83, 16.00) depending on how it is rounded.
    b. No, cannot use a confidence interval to do a significance test that is one sided.
    c. from calculation: 34.57, therefore sample size = 35 (always round up)
    d. A
17.
    a. H_0: $\mu = 55$, H_a: $\mu > 55$
    b. t = 2.69
    c. P(T > 2.69), p-value between 0.005 and 0.010
    d. At a significance level of 1%. reject null hypothesis, evidence that the population mean speed traveled on I-440 is greater than 55 mph.
    e. 

18.
    a. H_0: $\mu = 570$, H_a: $\mu > 570$
    b. t = 2.14
    c. P(T > 2.14), p-value between 0.025 and 0.020
    d. Picture with line in the center, labeled with 0, line to the right labeled with 2.14, tail shaded to the right with a p-value of 0.025 to 0.020.
    e. At a significance level of 5%, reject null hypothesis, evidence that the population mean number of parked cars is greater than 570.

19.

   a. F – since the t-test statistic is positive and we are studying if cholesterol is reduced, this must mean that the researchers took before minus after.
   b. B – again, since we are looking at "reduced," our p-value is half the two-tailed result.
   c. A
   d. D

20.

   a. C
   b. B
   c. C
   d. B

21.

   a. (59.21,64.37)
   b. m = 2.58
   c. H_0: μ = 61.3, H_a: μ ≠ 61.3. The 99% confidence interval can be used to do this test as the alternate hypothesis is two sided and the test significance level is 1%. Since 61.3 is inside the CI, I would fail to reject the null hypothesis, no evidence population mean weight is different from 61.3 kg.

22.

   a. Matched pairs
   b. H_0: $\mu_{diff} = 0$; H_a: $\mu_{diff} > 0$, diff = y – x
   c. t = 2.378
   d. $t = \frac{\bar{d} - \mu_{diff}}{s_{diff}/\sqrt{n}} = \frac{0.85 - 0}{1.59852/\sqrt{20}}$
   e. P-value = 0.028/2 = 0.014
   f. Reject null hypothesis, evidence customers preferred new drink to old one for the population

23.

   a. H_0: μ = 150, H_a: μ > 150
   b. z = 14.04
   c. P-value = 0
   d. Reject null hypothesis, evidence the population average yield is above 150 (OR evidence the fertilizer increased yield for the population).
   e. Picture with line in the center, labeled with 150, line to the right labeled with 172.2, tail shaded to the right with a p-value of 0.

24.

   a. A
   b. B
   c. C
   d. t*= 1.729

25. A
26. F
27. A
28. D
29.

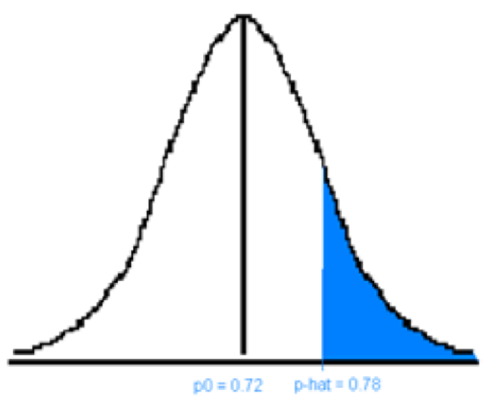
   a. H_0: μ = 10, H_a: μ ≠ 10

b. z = -5.00
c. p-value = 0
d. Reject null hypothesis, evidence population mean level of calcium differs from 10 mg/dl.

30.
a. C
b. D
c. D
d. F
e. A
f. (1.96/0.03)^2*(0.3*0.7 + 0.35*0.65) = 1867.444, so n_1 and n_2 must both be ≥ 1868.

31. E
32. B
33. D
34. C
35.
a. H_0: p = 0.72; H_a: p > 0.72
b. z = 0.945: (0.78-0.72)/sqrt(0.72*0.28/50)
c. 0.1711 or 0.1736 depending on rounding of test statistic
d. Fail to reject the null, there is not enough evidence to show that the percentage of engineering students who push the snooze button is more than 72%.

e.



e.
f. (0.6836, 0.8764) : 0.78 ± 1.645*sqrt(0.78*0.22/50)
g.

36. c
37. c
38. Picture with 5 at the center, 8.2 to the right of 5 indicating the location of the sample mean and 2 tails shaded with the total p-value of 0.005, lines drawn at 8.2 and 1.8 (symmetric to the 8.2 location to the left of 5).
39. d
40. Picture with 5 at the center, 8.2 to the right of 5 indicating the location of the sample mean and line drawn at 8.2, whole area under the curve to right of 8.2 shaded with a p-value of 0.0025.
41. b

42. D, 2 sample t comparison of means, 2 independent groups, one quantitative variable compared for the two groups
43. C, matched pair t, one quantitative variable tested in matched pair situation, before and after.
44. A, 1 sample z, population std dev known, one quantitative variable.
45. B, 1 sample t, sample std dev calculated, one quantitative variable.
46. E, 2-sample comparison of proportions
47. F, 1-sample proportion
48.
    a. C
    b. 4.87
    c. t*=2.797
    d. margin of error= 0.67 Lower Bound = 4.20 Upper Bound = 5.54
    e. A
49.
    a.

BEFORE	AFTER	DIFF
72	67	5
78	75	3
65	62	3
80	76	4
75	73	2
68	71	-3
70	65	5
82	83	-1
76	72	4
71	69	2
	dbar	2.40

    b. Using C-Level 0.9 and t for df=9 and then taking standard error from the output, we have 2.4 ± 1.833*0.81921372 = (0.893, 3.907)
    c. A
50.
    a. 0.05
    b. Beta
    c. 0.10
    d. Alpha
    e. 0.05
    f. Power
    g. 0.90
    h. 15
    i. 1.645
    j. -1.28
    k. 20.561
    l. 24.9
51.
    a. 0.9222
    b. 145

52.

a. 0.5
b. $m = 0.041$
c. (0.459, 0.541)

53.

a. H_0: $p = 0.1$, H_a: $p \neq 0.1$
b. z = (0.06 – 0.1)/sqrt(0.1*0.9/200) = -1.89
c. P-val = 2*P(Z>|-1.89|) = 2*P(Z<-1.89) = 0.0588
d. center: 0, to the left: -1.89, area to the left of -1.89 and the symmetric one on the other side of the curve
e. Do not reject H_0. There is no evidence that the proportion of green M&Ms is not equal to 0.1 in the population
f. (1.96/0.03)^2*0.1*0.9 = 384.16 so $n \geq 385$.

54.

a. B
b. C
c. $s_p^2 = 122$, df = 198
d. B