Solutions of homework 10

16.3 (a) t^* = 2.015.

(b) t^* = 2.518.

16.9 (a) df = 24.

(b) t = 1.12 is between 1.059 (p =0.15) and 1.318 (p = 0.10).

(c) Double the value of P because Ha is two-sided: The P-value is between 0.30and 0.20.

(d) t = 1.12 is not significant at either $\alpha = 0.10$ or $\alpha = 0.05$.

16.11 (a) For each subject, randomly select which knob that subject should use first.

(b) H_0: μ = 0 sec vs. Ha: μ < 0 sec, where μ is the mean of (right-thread time – left-thread time).

(c) $\bar{x}$ = -13.32 sec; $s/\sqrt{25}$ = $22.94/\sqrt{25} \approx 4.59$ sec, so t = -2.90. With df = 24, we see that 0.0025 < P < 0.005 (P = 0.0039). We have good evidence that the mean difference really is negative; i.e., the mean time for right-threaded knobs is less than the mean time for left-threaded knobs.

16.12 (a) μ is the mean difference in the returns (Vanguard minus managed fund).

(b) H_0: μ = 0 vs. Ha: μ > 0.

(c) With $\bar{x}$ = 2.83%, s = 11.65% and df = 23, we have t ≈ 1.19, so 0.10 < P < 0.15 (P = 0.123). The difference is not significant; it could have arisen by chance.

16.13 With df = 24, t^* = 1.711, the interval for μ is approximately –21.2 to –5.5 sec. We have $\bar{x}_{RH}$ = 104.12 and $\bar{x}_{LH}$ = 117.44, so that $\bar{x}_{RH}/\bar{x}_{LH}$ = 88.7%. Right-handers working with right-handed knobs can accomplish the task in about 90% of the time needed by those working with left-handed knobs.

17.11 (a) The two populations are breast-feeding women and other women.

(b) Stemplots are omitted; both distributions appear to be reasonable Normal.

(c) To test H_0: μ = 0 vs. Ha: μ > 0, we compute SE ≈ 0.45847 and t ≈ 8.50. The choice df (21 or 66.20) is irrelevant; P is tiny in either case, so we have strong evidence that nursing mothers lose bone mineral.

17.24 (a) To test H_0: $\mu_m = \mu_f$ vs. Ha: $\mu_m > \mu_f$, we compute SE ≈ 0.132148 and t ≈ 6.13. For either choice of df (595 or 977.68), the P- value is tiny, and we conclude that the male mean is higher.

(b) The sample contracted only people with telephones. Persons without phones are typically poorer, and may have road-rage characteristics different from the rest of the population.

17.25 We find SE ≈ 12.2065 g. the 90% confidence interval is (59 – 32) ± t^*SE, where t^* is either 1.860 (df = 8) or 1.7392 (df = 17.076). These lead (respectively) to the intervals 4.301 to 49.677 g, or 5.771 to 48.229 g. Because these intervals do not include 0, we can conclude that there is a significant difference at the two-sided 10% interval. (In fact, P = 0.0578 for df = 8 or 0.0409 for df = 17.076).

17.41 (a) The appropriate test is the matched pairs test because a student’s score on Try 1 is certainly correlated with his/her score on Try 2.

(b) To test H_0: μ = 0 vs. Ha: μ > 0, we compute t ≈ 10.16 with 426 degrees of freedom, which is certainly significant (P < 0.0005). Coached student do improve their scores.

(c) Table C gives t^* = 2.626 for df = 100. The confidence interval is 29 ± t^* 59/$\sqrt{427}$ = 21.50 to 36.50 points.

17.42 (a) The hypotheses are H_0: $\mu_1 = \mu_2$ vs. Ha: $\mu_1 > \mu_2$, where μ_1 is the mean gain among all coached students, and μ_2 the mean gain among all uncoached students. We find SE ≈ 3.0235 and t ≈ 2.646 with df = 426. Comparing with df = 100critical values in Table C, we find $0.0025 < P < 0.005$. There is evidence that coached students had a great average increase.

(b) The 99% confidence interval is 8 ± 3.0235t^*, where t^* equals 2.626. This gives 0.06 to 15.94 points.

(c) Increasing one's score by 0 to 16 points is not likely to make a difference in being granted admission to, or receiving scholarships from, any colleges.