

Confidence Intervals and Hypothesis Tests: Two Samples

9.3 t-Interval to Compare Two Population Means: Independent Samples (Equal Variances)

1. NFL players are paid on average less than athletes in other major sports in the USA, but perhaps they have longer careers than athletes in other leagues. A random selection of 28 NFL athletes who made their club's opening-day roster in their rookie year had an average career of 6.3 years with a standard deviation of 1.95 years. A similar sample of 27 NBA careers had an average length of 6.2 years with a standard deviation of 2.06 years. Create a 95% confidence interval for the true average difference between the lengths of careers for NFL athletes and NBA athletes (assume equal variances). Does there appear to be a significant difference between the leagues' average career lengths?
2. Who has lower calorie sandwiches, McDonald's or Wendy's? A random selection of 16 sandwiches from McDonald's had an average calorie count of 476.25 calories with a standard deviation of 143.24 calories. A random selection of 14 Wendy's sandwiches had an average calorie count of 426.43 with a standard deviation of 170.37 calories. Form a 98% confidence interval to compare the average calorie count of sandwiches at McDonald's and Wendy's (assume equal variances).
3. After the housing crisis led the US economy to a recession in December of 2007, the financial sector and real estate industry found themselves in need of good legal advice. A 2011 survey of 22 attorneys working as in-house counsels at real estate firms had an average annual salary of \$252,000 with a standard deviation of \$24,821. A similar survey polled 25 attorneys working as in-house counsel for financial firms and found they had an average salary of \$203,815 with a standard deviation of \$26,700. Create a 99% confidence interval for the true mean difference between in-house counsel salaries at real estate firms and in-house counsel salaries at financial firms (assume equal variances). Is there a significant difference? If so, how much of a difference?

Answers:

1. Because zero is inside the created interval, we cannot say there is a significant difference in career lengths, so not only are NFL athletes paid less but they do not have longer careers.

$$t_{\alpha/2} = 2.009$$

$$S_p^2 = 4.018888679$$

$$E = 1.08631$$

$$[-0.99, 1.19]$$

$$-0.99 < \mu_{nfl} - \mu_{nba} < 1.19$$

2. There does not appear to be a statistically significant difference between them since zero is in the interval.

$$t_{\alpha/2} = 2.467$$

$$S_p^2 = 24,467.95158$$

$$E = 141.2227206$$

$$[-91.403, 191.043]$$

$$-91.403 < \mu_{McD} - \mu_{Wdy} < 191.043$$

3. There is a significant difference, and it seems that the average difference is somewhere between \$27,865.42 and \$68,504.58. In other words, in house counsel at real estate firms earn on average somewhere between \$27,865 and \$68,505 more than in house counsel at financial firms.

$$t_{\alpha/2} = 2.690$$

$$S_p^2 = 667,712,952.5$$

$$E = 20,319.58176$$

$$[\$27,865.42, \$68,504.58]$$

$$\$27,865.42 < \mu_{RE} - \mu_{FF} < \$68,504.58$$