

## Answer on Question #84954 – Math – Statistics and Probability

### Question

The daily caloric intake for samples of adult males and adult females have the following summary statistics:

Sample Size Mean Standard Deviation

Males 15 2700 500

Females 10 2200 300

1. We would like to conduct a hypothesis test at the 1% level of significance to determine whether the true mean daily caloric intake for adult males is higher than the true mean daily caloric intake for adult females. What are the hypotheses for the appropriate test of significance?
2. Assuming daily caloric intake follows a normal distribution for both males and females, the P-value for the appropriate hypothesis test is:
  - A) between 0.0025 and 0.005
  - B) between 0.02 and 0.025
  - C) between 0.005 and 0.01
  - D) between 0.001 and 0.0025
  - E) between 0.01 and 0.02

### Solution

1. Null hypothesis  $H_0: \mu_M = \mu_F$ .

Alternative hypothesis  $H_a: \mu_M > \mu_F$ .

2. Test statistic: 
$$t = \frac{\bar{x}_M - \bar{x}_F}{\sqrt{\frac{(n_M - 1)s_M^2 + (n_F - 1)s_F^2}{n_M + n_F - 2} \left( \frac{1}{n_M} + \frac{1}{n_F} \right)}} = \frac{2700 - 2200}{\sqrt{\frac{(15 - 1)500^2 + (10 - 1)300^2}{15 + 10 - 2} \left( \frac{1}{15} + \frac{1}{10} \right)}} = 2.83$$

Degrees of freedom:  $df = n_M + n_F - 2 = 15 + 10 - 2 = 23$ .

P-value (from the table):  $p = 0.0047$ .

Since  $0.0025 < 0.0047 < 0.005$ , the answer is A) between 0.0025 and 0.005.