In a clothing factory employing female and male employees, it was observed that the average number of absences for male workers over a year is 15 with a standard deviation of 7; for female workers, the average number of absences is 10 with a standard deviation of 6. In an industry –wide survey 100 male employees and 50 female employees were sampled. What is the probability that the male sample will have at most three days more days absences than the female sample?

Solution

Find the mean difference (male absences minus female absences) in the population.

$$\mu_d = \mu_1 - \mu_2 = 15 - 10 = 5$$

Find the standard deviation of the difference.

$$\sigma_d = \sqrt{\left(\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}\right)}$$

$$\sigma_d = \sqrt{\frac{72}{100} + \frac{62}{50}} = \sqrt{\frac{49}{100} + \frac{36}{50}} = \sqrt{0.49 + 0.72} = \sqrt{1.21} = 1.1$$

Find the z-score that produced when male workers have three more days of absences than female workers. When boys have three more days of absences, the number of male absences minus female absences is three. And the associated z-score is

$$z = \frac{x - \mu}{\sigma} = \frac{3 - 5}{1.1} = -\frac{2}{1.1} = -1.818$$

Find the probability. This problem requires us to find the probability that the average number of absences in the male sample minus the average number of absences in the woman sample is less than 3. To find this probability, we enter the z-score (-1.818) into Stat Trek's Normal Distribution Calculator. We find that the probability of a z-score being -1.818 or less is about 0.035.

Therefore, the probability that the difference between samples will be no more than 3 days is 0.035.