

HW #9

(1) Two rubber compounds were tested for tensile strength and the following values were found

$$A : 32, 30, 33, 32, 29, 34, 32$$

$$B : 33, 35, 36, 37, 35, 34$$

Under the assumption that the two populations are normally distributed, test the hypothesis that the average tensile strength of the two rubber compounds is different using significance level $\alpha = 0.01$ and $\alpha = 0.05$.

(2) In comparing the times until failure (in hours) of two different types of light bulbs, we obtain the sample characteristics $n_1 = 45$, $\bar{x} = 984$, $s_x^2 = 8,742$ and $n_2 = 52$, $\bar{y} = 1,121$, $s_x^2 = 9,411$. Test the hypothesis that the average duration of the second type of light bulbs is higher than the first type. at significance level $\alpha = 0.05$.

(3) A sample of 12 radon detectors of a certain type was selected, and each was exposed to 100 pCi/L of radon. The resulting readings were as follows:

$$105.6, 90.9, 91.2, 96.9, 96.5, 91.3, 100.1, 105.0, 99.6, 107.7, 103.3, 92.4$$

(a) Does this data suggest that the population mean reading under these conditions differs from 100? State and test the appropriate hypotheses using significance level $\alpha = 0.05$.

(b) Suppose that prior to the experiment a value of $\sigma = 7.5$ had been assumed. How many determinations would then have been appropriate to obtain $\beta = 0.10$ for the alternative hypothesis $\mu_1 = 95$?

(4) Subjects in a study included a sample of 37 male soccer players whose mean body mass index (BMI) was 25.21 with a standard error of 1.67 and a sample of 24 male rugby players whose mean BMI was 27.15 with a standard error of 2.64. Is there sufficient evidence for one to claim that, in general, rugby players have a different BMI than soccer players? Let $\alpha = 0.01$.

(5) A study found that among 2430 boys ages 7 to 12 years, 450 were overweight or obese. On the basis of this study, can we conclude that more than 15 percent of the boys ages 7 to 12 in the sampled population are obese or overweight? Let $\alpha = 0.01$.

(6) A study is conducted to evaluate the analgesic effectiveness of a daily dose of oral methadone in patients with chronic neuropathic pain. The researchers used a scale $[0,100]$ with higher number indicating higher pain. Each subject took either 20 mg of methadone or placebo each day for 5 days, without knowing which treatment they were taking. The following table gives the mean maximum pain intensity scores for the 5 days for each subject. Do these data provide sufficient evidence to indicate that the maximum pain intensity is lower on days when methadone is taken? Let $\alpha = 0.05$.

Subject	Methadone	Placebo
1	29.8	57.2
2	73.0	69.8
3	98.6	98.2
4	58.8	62.4
5	60.6	67.2
6	57.2	70.6
7	57.2	67.8
8	89.2	95.6
9	97.0	98.4
10	49.8	63.2
11	37.0	63.6