# Tugas Pertemuan 6

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Soal 9.78 hal 371 buku *Elementary Statistics 8th Edition-neil Weiss*

**9.78 Worker Fatigue.** A study by M. Chen et al. titled "Heat Stress Evaluation and Worker Fatigue in a Steel Plant" (*American Industrial Hygiene Association*, Vol. 64, pp. 352–359) assessed fatigue in steel-plant workers due to heat stress. A random sample of 29 casting workers had a mean post-work heart rate of 78.3 beats per minute (bpm). At the 5% significance level, do the data provide sufficient evidence to conclude that the mean post-work heart rate for casting workers exceeds the normal resting heart rate of 72 bpm? Assume that the population standard deviation of post-work heart rates for casting workers is 11.2 bpm.

Solusi

1. Dik :   $\alpha = 5\%$
   $sd = 11,2$
   $n = 29$
   $\bar{X} = 78,3$

※ Step 1 menentukan hipotesis

$H_0 : \mu \leq 72$
$H_1 : \mu > 72$

※ Step 2 menghitung $t$ hitung

$$t\,hitung = \frac{\bar{X} - \mu}{sd/\sqrt{n}} = \frac{78,3 - 72}{11,2/\sqrt{29}}$$

$$= \frac{6,3}{2,079} \approx 3,0303$$

$df = 29 - 1$
$\quad = 28$

$\alpha$ dari tabel T didapat bahwa nilai peluang (p-Value) < 0,05

∴ Karena p-value < $\alpha$ maka ada yang kuat untuk menolak $H_0$

Mencari solusi dengan Rstudio

```
> # Masukkan data
> sample_mean <- 78.3   # Rata-rata sampel
> sample_size <- 29     # Ukuran sampel
> sample_sd <- 11.2     # Deviasi standar sampel
> population_mean <- 72 # Rata-rata populasi (yang diasumsikan)
>
> # Hitung t-statistic
> t_statistic <- (sample_mean - population_mean) / (sample_sd / sqrt(sample_size))
>
> # Hitung derajat kebebasan
> df <- sample_size - 1
>
> # Hitung p-value
> p_value <- 2 * (1 - pt(abs(t_statistic), df))
>
> # Tampilkan hasil
> cat("T-Statistic:", t_statistic, "\n")
T-Statistic: 3.029155
> cat("Degrees of Freedom:", df, "\n")
Degrees of Freedom: 28
> cat("P-Value:", p_value, "\n")
P-Value: 0.005225819
>
> # Uji hipotesis dengan tingkat signifikansi 5%
> alpha <- 0.05
> if (p_value < alpha) {
+     cat("Kita menolak hipotesis nol. Ada cukup bukti bahwa rata-rata denyut jantung melebihi 72 bpm.\n")
+ } else {
+     cat("Kita gagal untuk menolak hipotesis nol. Tidak ada cukup bukti untuk menyatakan bahwa rata-rata denyut jantung melebihi 72 bpm.\n")
+ }
Kita menolak hipotesis nol. Ada cukup bukti bahwa rata-rata denyut jantung melebihi 72 bpm.
```