

1. **Problem**

A machine fills milk into 500ml packages. It is suspected that the machine is not working correctly and that the amount of milk filled differs from the setpoint  $\mu_0 = 500$ . A sample of 247 packages filled by the machine are collected. The sample mean  $\bar{y}$  is equal to 521.3 and the sample variance  $s_{n-1}^2$  is equal to 527.08.

Test the hypothesis that the amount filled corresponds on average to the setpoint. What is the value of the  $t$  test statistic?

- (a) 1.275
- (b) -13.070
- (c) -53.309
- (d) 9.888
- (e) 14.581

**Solution**

The  $t$  test statistic is calculated by:

$$t = \frac{\bar{y} - \mu_0}{\sqrt{\frac{s_{n-1}^2}{n}}} = \frac{521.3 - 500}{\sqrt{\frac{527.08}{247}}} = 14.581.$$

The  $t$  test statistic is thus equal to 14.581.

- (a) False
- (b) False
- (c) False
- (d) False
- (e) True