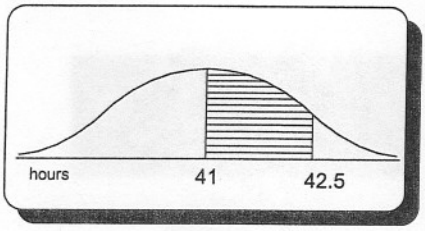
Probability Test Solutions

I. Average hours worked by manufacturing workers is normally distributed with a mean of 41 hours and a standard deviation of .5 hours. Graph and solve the following problems.

Given: $\mu = 41$ hours and $\sigma = .5$ hours

A. P(41hours $\leq x <$ 42.5 hours)

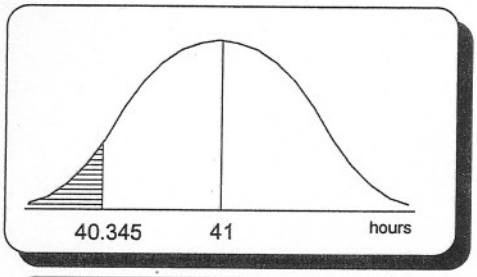
$$Z = \frac{x-\mu}{\sigma} = \frac{42.5-41.0}{.5} = \frac{1.5}{.5} = 3 \rightarrow .4987$$



B. P($x <$ 40.345 hours)

$$Z = \frac{x-\mu}{\sigma} = \frac{40.345-41.000}{.5} = \frac{-.655}{.5} = -1.31 \rightarrow .4049$$

.5000
−.4049
.0951 → 9.51%

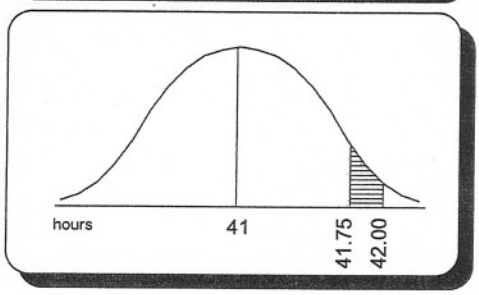


C. P(41.75 hours $\leq x <$ 42 hours)

$$Z = \frac{x-\mu}{\sigma} = \frac{42.00-41.00}{.5} = \frac{1}{.5} = 2.0 \rightarrow .4772$$

$$Z = \frac{x-\mu}{\sigma} = \frac{41.75-41.00}{.5} = \frac{.75}{.5} = 1.5 \rightarrow .4332$$

.4772
−.4332
.0440 → 4.4%

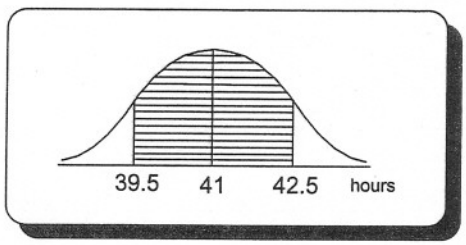


D. P(39.5 hours $\leq x <$ 42.5 hours)

$$Z = \frac{x-\mu}{\sigma} = \frac{39.5-41.00}{.5} = \frac{-1.5}{.5} = -3.0 \rightarrow .4987$$

$$Z = \frac{x-\mu}{\sigma} = \frac{42.5-41.00}{.5} = \frac{1.5}{.5} = 3.0 \rightarrow .4987$$

.4987
+.4987
.9974



II. Study time at State University is normally distributed with a mean of 15 hours per week and a standard deviation of 3 hours. Graph and solve the following problems.

A. How many hours must a student study to be in the top 1% of the students attending State University?

Given:

$\mu = 15$ hours

$\sigma = 3$ hours

$.50 - .01 = .49 \rightarrow z = 2.33$

$\mu \pm z\sigma$

$15 + 2.33(3)$

$15 + 6.99$

22 hours