

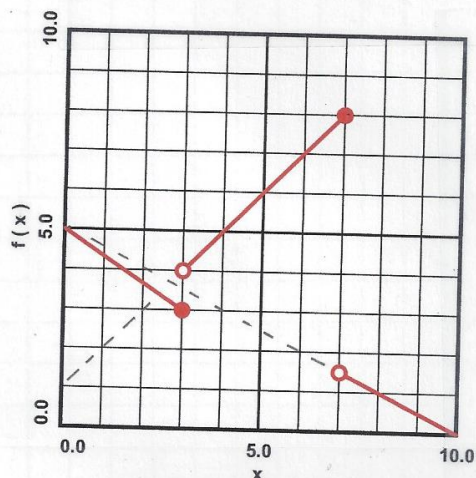
# 18.4. Piecewise-Defined Functions

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Example #1. Graph

$$f(x) = \begin{cases} -\frac{2}{3}x + 5, & x \leq 3 \\ x + 1, & 3 < x \leq 7 \\ -\frac{1}{2}x + 5, & x > 7 \end{cases}$$

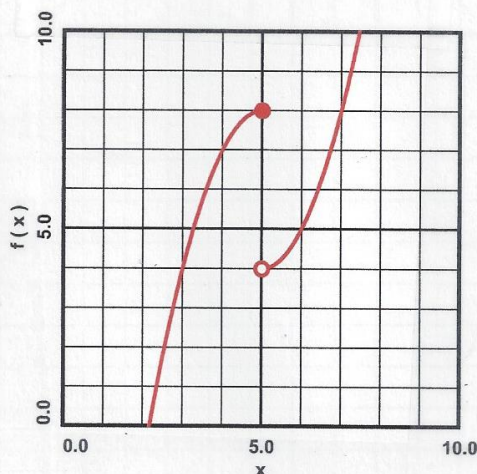
SOLUTION:



Example #2. Graph

$$f(x) = \begin{cases} -x^2 + 10x - 17, & x \leq 5 \\ x^2 - 10x + 29, & x > 5 \end{cases}$$

SOLUTION:



Example #3. For

$$f(x) = \begin{cases} 2^x, & x \leq 2 \\ \frac{1}{2}x + 2, & 2 < x \leq 6 \\ x^2 - 12x + 37, & x > 6 \end{cases}$$

(a) Evaluate  $f(1)$ ,  $f(2)$ ,  $f(6)$  and  $f(8)$

(b) Calculate the average rate of change of  $f$  with respect to  $x$  on  $1 \leq x \leq 8$ .

SOLUTION:

(a)  $f(1) = 2^1 = 2$

$f(2) = 2^2 = 4$

$f(6) = \frac{1}{2}(6) + 2 = 5$

$f(8) = 8^2 - 12(8) + 37 = 5$

(b)  $\frac{f(8) - f(1)}{8 - 1} = \frac{5 - 2}{8 - 1} = \frac{3}{7}$