Solution

Math 151 Section___

HW 1, due at the beginning of class at week two recitation.

Answer all questions to the best of your ability. Full credit will only be given if all work is shown and organized and it is clear what your answer is. The HW is out of 12 points with part of the points from attempting the problems and part of the points from accuracy.

- Section 1.1, 1.2, 1.3, 1.5 and 2.1

1.1.35 \( x^2 + y - 9 = 0 \) \( \Rightarrow \) \( y = 9 - x^2 = f(x) \)

- \( x \)-int: \( 0 = 9 - x^2 \) \( \Rightarrow \) \( x^2 = 9 \) \( \Rightarrow \) \( x = \pm 3 \)
- \( y \)-int: \( f(0) = 9 - 0 = 9 \) \( \Rightarrow \) \( y = 9 \)
- \( f(-x) = 9 - (-x)^2 = 9 - x^2 = f(x) \) \( \Rightarrow \) even

1.2.11 Find \( \frac{f(x+h) - f(x)}{h} \), \( h \neq 0 \), if \( f(x) = x^2 - x + 4 \)

- \( f(x+h) = (x+h)^2 - (x+h) + 4 = x^2 + 2xh + h^2 - x - h + 4 \)
- \( f(x+h) - f(x) = \frac{x^2 + 2xh + h^2 - x - h + 4 - (x^2 - x + 4)}{h} \)

\[ = \frac{x^2 + 2xh + h^2 - x - h + 4 - x^2 + x - 4}{h} \]
\[ = \frac{2xh + h^2 - x - h}{h} \]
\[ = h(2x + h - 1) \]
\[ \frac{2x + h - 1}{h} \]

1.3.17 \( f(x) = \frac{x+3}{x-6} \)

- \( f(3) = \frac{5}{3} \neq 14 \) so \((3, 14)\) is not on the graph
- if \( x=4 \), \( f(x) = f(4) = \frac{6}{2} = 3 \) which corresponds to \((4, -3)\)

- if \( f(x) = 3 \) then \( 2 = \frac{x+3}{x-6} \) \( \Rightarrow \) \( 3(x-6) = x+3 \) \( \Rightarrow \) \( 3x-18 = x+3 \)

\( \Rightarrow \) \( x = 14 \) which corresponds to point \((14, 2)\)

- \( \text{Dom}(f) = \{x \mid x \neq 6 \} \)

- \( x \)-int: \( f(x) = 0 \) \( \Rightarrow \) \( x+3 = 0 \) \( \Rightarrow \) \( x = -3 \), which is point \((-3, 0)\)

- \( y \)-int: \( f(0) = \frac{3}{6} = \frac{1}{2} \) \( \Rightarrow \) \( y = -\frac{1}{2} \), which is point \((0, -\frac{1}{2})\)
\[ f(x) = -2x^2 + 4x - 3 \]

\[ f(\frac{1}{2}) = -2\cdot\frac{1}{4} + 2\cdot\frac{1}{2} - 3 = -\frac{1}{2} + 1 - 3 = -2.5 \]

The graph opens down since the leading coefficient \((-2)\) is negative.

The vertex is \( \left( -\frac{b}{2a}, f\left( -\frac{b}{2a}\right) \right) = \left( \frac{1}{2}, f\left( \frac{1}{2}\right) \right) = \left( \frac{1}{2}, -2.5 \right) \)

The y-int. \( \Theta \) is \( f(0) = -3 \), \( \Theta \) which is point \((0, -3)\)

The x-ints: are found by solving \(-2x^2 + 4x - 3 = 0\),

Using the quadratic equation we get

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ = \frac{-4 \pm \sqrt{(-4)^2 - 4(-2)(-3)}}{-4} \]

\[ = \frac{-2 \pm \sqrt{-4}}{-4} \]

Since the discriminant \((the \ b^2 - 4ac = -4)\) is negative we have no x-intercepts.