Math-110 College Algebra
Fall 2007
8/30/07

Note: Show all work. Correct answers without support will receive at most half credit. Incorrect answers without support will receive no credit.

Name: Solution Guide

Quiz 1

#1 Given the function:

\[ f(x) = \begin{cases} \frac{1}{x} & x \leq 0 \\ 108 & 0 < x \leq 3 \\ x^2 + 2 & x > 3 \end{cases} \]

find \( f(-1), f(0), f(2), f(3), \) and \( f(4) \).

\[ f(-1) = \frac{1}{-1} = -1 \]
\[ f(0) = 108 \]
\[ f(2) = 108 \]
\[ f(3) = 108 \]
\[ f(4) = (4)^2 + 2 = 18 \]

#2 Write the polynomial \( 4x(x^2 + 3x) - (x - 2)(x + 6) \) in simplified form.

\[ 4x(x^2 + 3x) - (x - 2)(x + 6) = 4x^3 + 12x^2 - (x^2 + 4x - 12) \]
\[ = 4x^3 + 12x^2 - x^2 - 4x + 12 \]
\[ = 4x^3 + 11x^2 - 4x + 12 \]
#3 Let \( f(x) = \frac{x+2}{3x} \). Simplify the following expressions:

a.) \( f(y-3) \)

b.) \( f(3 - y) \)

c.) \( y - f(3) \)

d.) \( f(y) - f(3) \)

a.) \[ f(y-3) = \frac{(y-3)+2}{3(y-3)} = \frac{y-1}{3(y-3)} \]

b.) \[ f(3 - y) = \frac{(3-y)+2}{3(3-y)} = \frac{5-y}{3(3-y)} \]

c.) \[ y - f(3) = y - \frac{3+2}{3 \cdot 3} = y - \frac{6}{9} \]

d.) \[ f(y) - f(3) = \frac{y+2}{3y} - \frac{5}{9} \]

#4 Determine the zeros and domain of the function \( f(x) = \frac{\sqrt{2x+7}}{x-3} \).

**Zeros:**

The numerator must equal 0. Therefore,

\[ \sqrt{2x+7} = 0 \]

\[ \Rightarrow 2x+7=0 \]

\[ 2x = -7 \]

\[ x = -\frac{7}{2} \]

**Domain:**

First we must make sure that:

\[ 2x+7 \geq 0 \quad (\text{Can't take } \sqrt{\text{ of a negative number}}) \]

\[ \Rightarrow x \geq -\frac{7}{2} \]

Next we have to be sure that we don't divide by 0. Therefore,

\[ x \neq 3 \]

Now, both of these statements must be true. So

\[ x \geq -\frac{7}{2} \text{ and } x \neq 3 \]

On, in interval notation:

\[ D: \left[-\frac{7}{2}, 3\right) \cup (3, \infty) \]