1/12/2017

Diagnostic

MATH 105, Fall 2015

Name (Please print):_____

Answer, to the best of your ability, the following questions. Show all work and circle your answer **on a separate sheet of paper**. Feel free to skip questions you do not understand. The point is demonstrate your level of comprehension of basic prerequisite material.

1. Simplify as much as possible so that your answers contains only positive exponents.

   (a) $6x^3 \cdot 2x^{-1}$

   (b) $\left(\dfrac{x^{-2}y^{-1}}{2x^2y^3}\right)^{-2}$

   (c) $16^{-3/4}$

2. Simplify as much as possible.

$$\frac{6}{5\sqrt{9-x^2}}$$

3. Perform the indicated operations and simplify the expressions as much as possible.

   (a) $(x^3 + 4x^2 - x) - (-2x^3 + 6x - 3)$

   (b) $[(2x^2 - x) + (3x + 2)] - [(x - 3) - (x^2 + 1)]$

4. Expand the following expressions.

   (a) $(2x + 9)^2$

   (b) $(2x + 5y)(4x^2 - 10xy + 25y^2)$

5. Describe (in the indicated way) the line given by:

   (a) Passing through $(-3, 7)$ with slope $5/8$; standard form

   (b) Parallel to $5x - 3y = 7$ and passing through $(-3, 3)$; slope-intercept form

6. Find the x-intercepts, and maximum and minimum values for y (when they exist—state if they do not). Sketch the graph of the relation in a suitable window.

   (a) $y = 3(x-2)^2 + 5$

   (b) $y = 2x^2 - 3x - 2$

7. Let $f(x) = \begin{cases} 2x+1 & x \leq -1 \\ x^2 - 2 & x > -1 \end{cases}$. Find:

   (a) $f(-2)$

   (b) $f(-1)$

   (c) $f(-.5)$

   (d) $f(0)$

8. Let $f(x) = 5x - 2$ and $h(x) = \sqrt{x+3}$. Find

$$h \circ f\ (x).$$

9. Compute $f(x+h) - f(x)$ for $f(x) = 2x^2 - 5x + 3$.