

Math 205 Quiz 1

June 6, 2016

Name: ANSWERS

Instructions: No calculators. Use your own scrap. Write your fully simplified answers in the space provided.

1. Evaluate each expression without a calculator.

(a) $(-3)^4 = 81$ (b) $-3^4 = -81$ (c) $3^{-4} = \frac{1}{81}$

(d) $\frac{5^{23}}{5^{21}} = 25$ (e) $\left(\frac{2}{3}\right)^{-2} = \frac{9}{4}$ (f) $16^{-3/4} = \frac{1}{8}$

2. Simplify each expression. No negative exponents in your answer.

(a) $\sqrt{200} - \sqrt{32} = 6\sqrt{2}$ (b) $(3a^3b^3)(4ab^2)^2 = 48a^5b^7$

(c) $\left(\frac{3x^{3/2}y^3}{x^2y^{-1/2}}\right)^{-2} = \frac{1}{9y^7}$

3. Expand and simplify.

(a) $-(x+3)(4x-5) = 4x^2 + 7x - 15$ (b) $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b}) = a - b$

(c) $(2x+3)^2 = 4x^2 + 12x + 9$ (d) $(x+2)^3 = x^3 + 6x^2 + 12x + 8$

4. Factor each expression.

(a) $4x^2 - 25 = (2x-5)(2x+5)$ (b) $2x^2 + 5x - 12 = (2x-3)(x+4)$

(c) $x^3 - 3x^2 - 4x + 12 = (x-3)(x-2)(x+2)$ (d) $x^4 + 27x = x(x+3)(x^2-3x+9)$

(e) $3x^{3/2} - 9x^{1/2} + 6x^{-1/2} = 3x^{-1/2}(x-1)(x-2)$ (f) $x^3y - 4xy = xy(x-2)(x+2)$

5. Simplify the rational expression.

(a) $\frac{x^2+3x+2}{x^2-x-2} = \frac{x+2}{x-2}$ (b) $\frac{2x^2-x-1}{x^2-9} \cdot \frac{x+3}{2x+1} = \frac{x-1}{x-3}$

(c) $\frac{x^2}{x^2-4} - \frac{x+1}{x+2} = \frac{1}{x-2}$ (d) $\frac{\frac{y}{x} - \frac{x}{y}}{\frac{1}{y} - \frac{1}{x}} = -(x+y)$

6. Rationalize the expression and simplify.

(a) $\frac{\sqrt{10}}{\sqrt{5}-2} = 5\sqrt{2} + 2\sqrt{10}$ (b) $\frac{\sqrt{4+h}-2}{h} = \frac{1}{\sqrt{4+h} + 2}$

7. Rewrite by completing the square.

(a) $x^2 + x + 1 = \left(x + \frac{1}{2}\right)^2 + \frac{3}{4}$ (b) $2x^2 - 12x + 11 = 2(x-3)^2 - 7$

8. Solve the equations for all real solutions.

(a) $\frac{2x}{x+1} = \frac{2x-1}{x}$ $x = \underline{1}$ (b) $x^2 - x - 12 = 0$ $x = \underline{-3, 4}$
(c) $2x^2 + 4x + 1 = 0$ $x = \underline{-1 \pm \frac{\sqrt{2}}{2}}$ (d) $3|x - 4| = 10$ $x = \underline{\frac{2}{3}, \frac{22}{3}}$

9. Solve each inequality. Write your answer in interval notation.

(a) $-4 < 5 - 3x \leq 17$ $x \in \underline{[-4, 3)}$ (b) $x^2 < 2x + 8$ $x \in \underline{(-2, 4)}$
(c) $x(x-1)(x+2) > 0$ $x \in \underline{(-2, 0) \cup (1, \infty)}$ (d) $|x - 4| < 3$ $x \in \underline{(1, 7)}$
(e) $\frac{2x-3}{x+1} \leq 1$ $x \in \underline{(-1, 4]}$

10. State whether each equation is true or false by writing "T" or "F", respectively.

(a) $(p+q)^2 = p^2 + q^2$ F (b) $\sqrt{ab} = \sqrt{a}\sqrt{b}$ T (c) $\sqrt{a^2 + b^2} = a + b$ F
(d) $\frac{1+Tc}{c} = 1 + T$ F (e) $\frac{1}{x-y} = \frac{1}{x} - \frac{1}{y}$ F (f) $\frac{\frac{1}{a} \cdot \frac{1}{b}}{\frac{1}{x} \cdot \frac{1}{x}} = \frac{1}{a-b}$ T

11. Find an equation for the line that passes through the point $(2, -5)$ and

(a) has slope -3 $y = -3x + 1$ (b) is parallel to the x -axis $y = -5$
(c) is parallel to the y -axis $x = 2$ (d) is parallel to $2x - 4y = 3$ $y = \frac{1}{2}x - 6$

12. Find the equation of the line that contains $A(-7, 4)$ and $B(5, -12)$. $y = -\frac{4}{3}x - \frac{16}{3}$

13. Find the center and radius of the circle with equation $x^2 + y^2 - 6x + 10y + 9 = 0$.

(a) Center $(3, -5)$ (b) Radius 5

14. If $f(x) = x^3$, find and simplify $\frac{f(2+h) - f(2)}{h} = \underline{12 + 6h + h^2}$

15. Find the domain of the following functions. Write in interval notation.

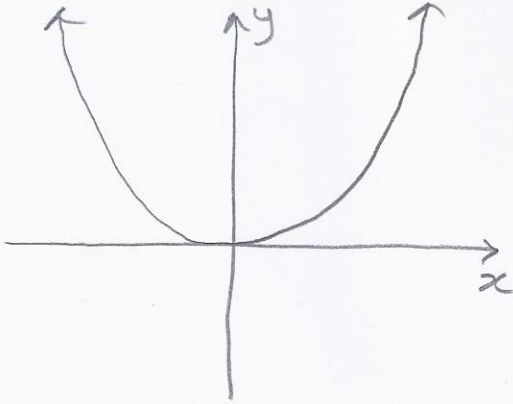
(a) $f(x) = \frac{2x+1}{x^2+x-2}$ $D: \underline{(-\infty, -2) \cup (-2, 1) \cup (1, \infty)}$ (b) $g(x) = \frac{\sqrt[3]{x}}{x^2+1}$ $D: \underline{(-\infty, \infty)}$
(c) $\sqrt{4-x} + \sqrt{x^2-1}$ $D: \underline{(-\infty, -1] \cup [1, 4]}$

16. If $f(x) = x^2 + 2x - 1$ and $g(x) = 2x - 3$, find:

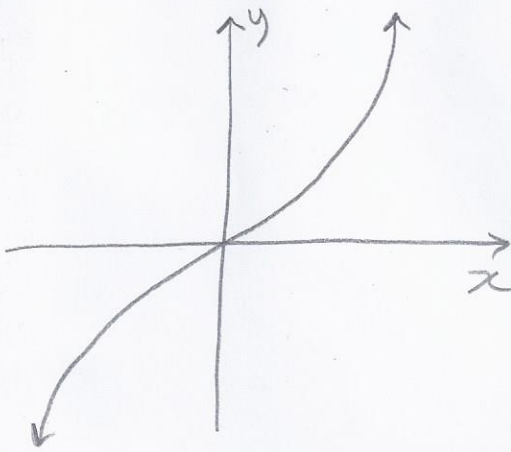
(a) $f \circ g$ $4x^2 - 8x + 2$ (b) $g \circ f$ $2x^2 + 4x - 5$

17. Sketch the graphs of the given functions.

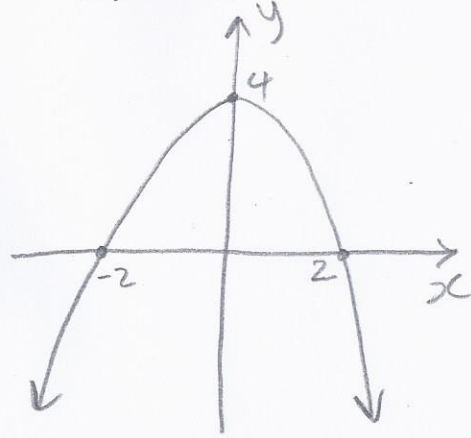
(a) $y = x^2$



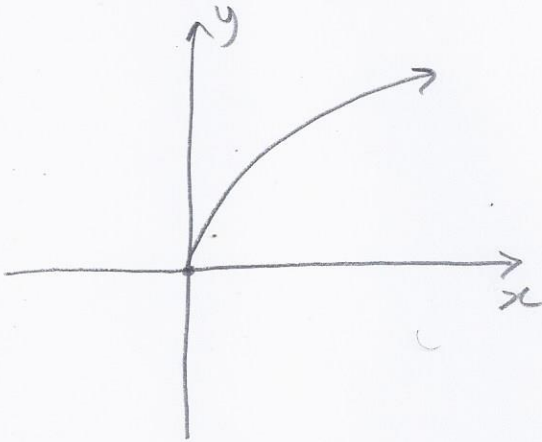
(b) $y = x^3$



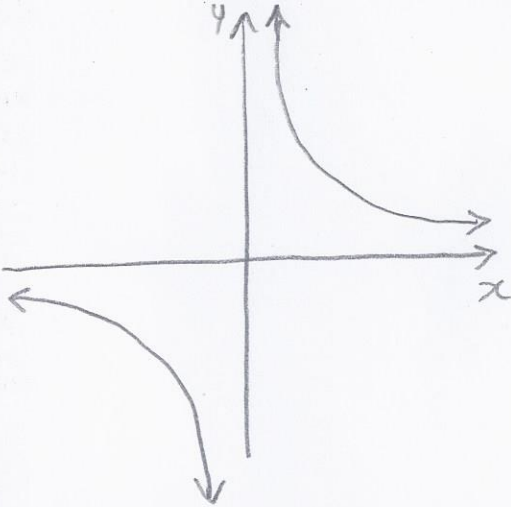
(c) $y = 4 - x^2$



(d) $y = \sqrt{x}$



(e) $y = \frac{1}{x}$



(f) $2x + 3y = 6$

