

26 points

Name:

MATH 125
Professor DeStefano
Precalculus Diagnostic Quiz
September 3, 2009

- solutions

You must show all work to receive full credit.

1. Find all values of x that satisfy the inequality below.

$$6 - 3x < 9$$

3 points

$$-3x < 9 - 6$$

$$-3x < 3$$

$$x > -1$$

← divide both sides by -3
reverse inequality due to negative

2. Simplify

$$(x^3 y^{-4})^2 \left(\frac{y^{-3}}{x^2} \right) = x^6 y^{-8} y^{-3} x^{-2} = x^4 y^{-11} = \frac{x^4}{y^{11}}$$

3 points

3. Solve for x :

(a) $x^2 - 2x - 3 = 0$

3 points

$$(x-3)(x+1) = 0$$

$$x = 3, x = -1$$

(b) $x^3 + 4x^2 + 2x = 0$

4 points

$$x(x^2 + 4x + 2) = 0$$

$$x = 0 \text{ and } x = \frac{-4 \pm \sqrt{4^2 - 4(1)(2)}}{2(1)} = \frac{-4 \pm 2\sqrt{2}}{2} = -2 \pm \sqrt{2}$$

4. Simplify

$$\frac{x^2}{x^2 - 9} + \frac{2}{x - 3}$$

3 points

$$= \frac{x^2}{(x+3)(x-3)} + \frac{2}{(x-3)} \frac{(x+3)}{(x+3)}$$

$$= \frac{x^2 + 2(x+3)}{(x+3)(x-3)} = \frac{x^2 + 2x + 6}{x^2 - 9}$$

5. Simplify

$$\frac{2x(3x^2 - 4) - x^2(6x)}{(3x^2 - 4)^2}$$

3 points

$$= \frac{6x^3 - 8x - 6x^3}{(3x^2 - 4)^2} = \frac{-8x}{(3x^2 - 4)^2}$$

6. If $f(x) = x^2 - 4$ and $g(x) = \sqrt{x}$, find and simplify the following.

(a) $f(2+h)$

3 points

$$\begin{aligned} f(2+h) &= (2+h)^2 - 4 \\ &= 4 + 4h + h^2 - 4 \\ &= 4h + h^2 \end{aligned}$$

(b) $f(g(x)) =$

2 points

$$\begin{aligned} f(g(x)) &= f(\sqrt{x}) = (\sqrt{x})^2 - 4 \\ &= x - 4 \end{aligned}$$

(c) $g(f(x))$

2 points

$$g(f(x)) = g(x^2 - 4) = \sqrt{x^2 - 4}$$