Name Key MR12 Test 6 Take Home Due Jan 3, 2012

You Must Show Work or No Credit.

1. The roots of the equation $x^2 - 6x + 10 = 0$ are
(1) real, rational, and equal
(2) real, rational, and unequal
(3) real, irrational, and unequal
(4) imaginary

$D = 36 - 4(1)10)$
$36 - 40 = (-4)$

2. Rationalize the denominator:

$\frac{4}{2-\sqrt{8}}$ $2+\sqrt{8}$ $2+\sqrt{8}$

$\frac{8+4\sqrt{8}}{4-8} = \frac{8+4\sqrt{8}}{-4}$

$\frac{-2-2\sqrt{2}}{-4}$ $\frac{8+8\sqrt{2}}{-4} = \frac{8+4\cdot 2\sqrt{2}}{-4}$

3. Simplify:

$\frac{3}{x+1} + \frac{x-2}{x}$

$\frac{x}{x}\frac{3}{x+1} + \frac{x-2}{x}\left(\frac{x+1}{x+1}\right)$

$\frac{3x}{x(x+1)} + \frac{(x-2)(x+1)}{x(x+1)}$

$\frac{3x + (x^2 - 2x - x - 2}{x(x+1)} = \frac{3x+x^2-x-2}{x(x+1)} = \frac{x^2+2x-2}{x(x+1)}$

4. Simplify

$\frac{x^2-7x}{5x} \cdot \frac{5x+10}{x-7}$

$\frac{x(x-7)}{5x} \cdot \frac{5(x+2)}{(x-7)}$

$= x+2$

5. Perform the indicated operations

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

$-1 \quad 1$

$\frac{2(x-1)}{3-x} \cdot \frac{(x-3)(x+3)}{(x-1)(x+3)}$

$\frac{-2(x-1)}{(x-1)} = -2$

6. Solve the following equation:

$4x\left(\frac{x-1}{4x} + \frac{3}{x} = 3\right)$

$x - 1 + 12 = 3(4x)$

$x - 11 = 12x$
$-x \quad -x$

$\frac{-11}{-11} = \frac{11x}{11}$

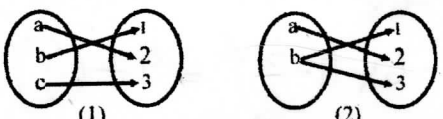
$1 = x$ $x \neq 0$

7. Solve for x

$\frac{x}{x+4} = \frac{2}{x}$ $\{4, -2\}$

$x^2 = 2(x+4)$ | $x^2 - 2x - 8 = 0$
$(x-4)(x+2) = 0$

8. Which diagram shows **a function** that is **not onto**?



9. $f(x) = x^2 - 3x + 5$, find:

a) f(3)

$3^2 - 3(3) + 5$

$9 - 9 + 5 = 5$

10. What is the domain of $f(x) = \sqrt{x+7}$

(1) $x \geq -7$ (2) $x \leq -7$

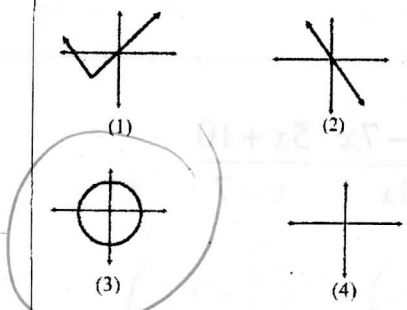
(3) $x > -7$ (4) $x \neq -7$

$(0 \geq \sqrt{x+7})^2$

$0 \geq x + 7$

$-7 \geq x$ $\quad x \leq -7$

11. Which graph is not a function?



12. If $f(x) = x^2 + 5x - 6$ and $g(x) = x - 2$, find:

a) (f(g)(4) $\quad fog(4)$

$g(4) = 4 - 2 = 2 \quad g(x) = 2$

$f(2) = 2^2 + 5(2) - 6$

$4 + 10 - 6 = 14 - 6$

$= 8$

13) Using $f(x) = x^2$ and $g(x) = 3x - 2$, find:

a) $f(g(x))$

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

$9x^2 - 6x - 6x + 4$

$= 9x^2 - 12x + 4$

14. If a function is defined by the equation $y = 3x + 2$, find the inverse of this function?

$y = 3x + 2 \quad x = 3y + 2$

-2

$\frac{x-2}{3} = \frac{3y}{3}$

$y = \frac{x-2}{3}$

15. If $f(x) = 4x^0 + (4x)^{-1}$, what is the value of $f(4)$?

$4(4^0) + (4 \cdot 4)^{-1}$

$4(1) + 16^{-1}$

$4 + \frac{1}{16} = 4\frac{1}{16} = \frac{65}{16}$

16. Solve: $\sqrt{x+1} + 5 = 0$

$(\sqrt{x+1} = -5)^2$ No Solution

$x + 1 = 25$

$-1 \quad -1$

$x = +24$

Reject Answer

17. Solve the following equations by completing the square orthe quadratic formula:

$x^2 - 6x - 9 = 0$

$x^2 - 6x = 9$

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

18. What is the domain of the function $f(x) = \frac{2x^2}{x^2 - 9}$?

$x^2 - 9 > 0$

$(x-3)(x+3) > 0$

(1) all real numbers except 0

(2) all real numbers except 3

(3) all real numbers except 3 and –3

(4) all real numbers

$x = 3, -3$

(3) (4)

$4+10-6 = 14-6$
$= 8$

13) Using $f(x) = x^2$ and $g(x) = 3x - 2$, find:

a) $f(g(x))$

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$(\sqrt{x+1} = -5)^2$ No Solution

$x+1 = 25-1$
$\quad -1 \quad -1$

$x = +24$

Reject Answer

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$(x - 6x + 9) = 9 + 9$

$\sqrt{(x-3)^2} = \sqrt{18}$

$x - 3 = \pm\sqrt{18}$

$x = 3 \pm \sqrt{18}$

$3 \pm \sqrt{9}\sqrt{2}$

$3 \pm 3\sqrt{2}$

18. What is the domain of the function $f(x) = \frac{2x^2}{x^2-9}$?

$x^2 - 9 > 0$

$(x-3)(x+3) > 0$

(1) all real numbers except 0
(2) all real numbers except 3
(3) all real numbers except 3 and –3
(4) all real numbers

$x = 3, -3$