MA105F Final Exam   December 2007

This multiple choice test consists of 25 questions. All questions are equally weighted.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the product.

1) $(x - 4y)(5x - 9y)$

    A) $5x^2 - 29xy - 29y^2$

    B) $x^2 - 29xy + 36y^2$

    C) $x^2 - 29xy - 29y^2$

    D) $5x^2 - 29xy + 36y^2$

Simplify the exponential expression.

2) $x^9 y^0$

    A) $\dfrac{1}{x^9}$

    B) 1

    C) x^9

    D) 0

Perform the indicated operations.

3) $(9x^4 + 3xy - y^3) - (x^4 + 7xy + 3y^3)$

    A) $9x^4 - 4xy - 4y^3$

    B) $10x^4 + 12xy + 2y^3$

    C) $8x^4 - 4xy - 4y^3$

    D) $8x^4 - 4xy - 2y^3$

Perform the indicated operations. Write the resulting polynomial in standard form.

4) $(-5x^6 - 13x^5 - 19) + (3x^6 + 9x^5 + 3)$

    A) $-2x^6 - 4x^5 - 16$

    B) $-2x^6 + 14x^5 + 22$

    C) $-22x^{11}$

    D) $-2x^6 - 4x^5 + 22$

Multiply or divide as indicated.

5) $\dfrac{x^2 - 5x + 6}{x^2 + x - 6} \cdot \dfrac{x^2 - 4}{x^2 - x - 6}$

    A) $\dfrac{x - 3}{x + 2}$

    B) $\dfrac{x + 2}{x - 3}$

    C) $\dfrac{x - 2}{x + 3}$

    D) $\dfrac{x + 2}{x + 3}$

Use interval notation to represent all values of x satisfying the given conditions.

6) $y_1 = 6x - 6$, $y_2 = 5x - 4$, and $y_1 \leq y_2$.

    A) $[-10, \infty)$

    B) $[2, \infty)$

    C) $(-\infty, 2]$

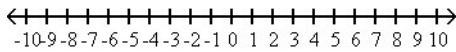   D) $(-\infty, 2)$

Solve the formula for the specified variable.

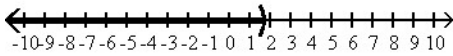7) $d = rt$ for t

    A) $t = \dfrac{r}{d}$

    B) $t = d - r$

    C) $t = d\,r$

    D) $t = \dfrac{d}{r}$

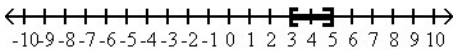**Express the interval in set–builder notation and graph the interval on a number line.**
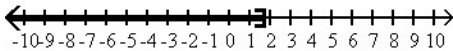
8) $\left(-\infty, \dfrac{5}{3}\right]$

    -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

    A) $\left\{x \mid x < \dfrac{5}{3}\right\}$

    -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

    B) $\{x \mid 3 \leq x \leq 5\}$

    -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

    C) $\left\{x \mid x \leq \dfrac{5}{3}\right\}$

    -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

    D) $\left\{x \mid x > \dfrac{5}{3}\right\}$

    -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
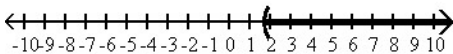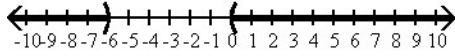
Solve the absolute value inequality. Other than ∅, use interval notation to express the solution set and graph the solution set on a number line.
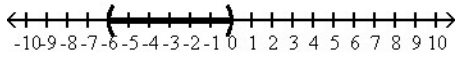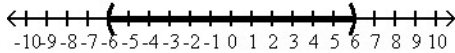
9) $\left| \dfrac{2y + 6}{3} \right| < 2$
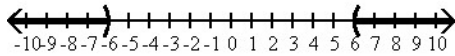
<---+++++++++++++++++++++++++--->
-10-9-8-7-6-5-4-3-2-1 0 1 2 3 4 5 6 7 8 9 10

A) $(-\infty,\ -6) \cup (0,\ \infty)$

<---++++)+++++(++++++++++--->
-10-9-8-7-6-5-4-3-2-1 0 1 2 3 4 5 6 7 8 9 10

B) $(-6, 0)$

<---+++(+++++++)++++++++++--->
-10-9-8-7-6-5-4-3-2-1 0 1 2 3 4 5 6 7 8 9 10

C) $(-6,\ 6)$

<---+++(++++++++++++)++++--->
-10-9-8-7-6-5-4-3-2-1 0 1 2 3 4 5 6 7 8 9 10

D) $(-\infty,\ -6) \cup (6,\ \infty)$

<---++)++++++++++++++(++--->
-10-9-8-7-6-5-4-3-2-1 0 1 2 3 4 5 6 7 8 9 10
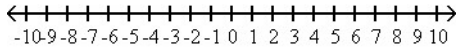
Use the graph of the given function to find any relative maxima and relative minima.

10) $f(x) = x^3 - 3x^2 + 1$
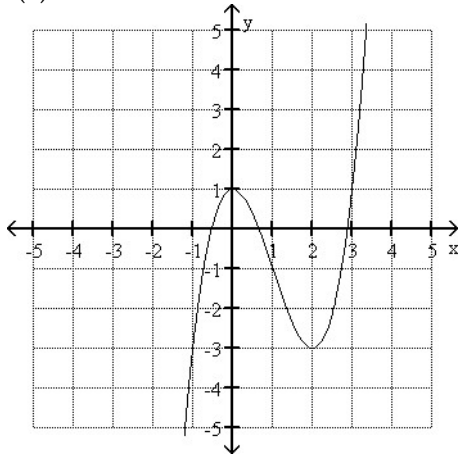
A) maximum: none; minimum: (2, –3)
B) no maximum or minimum
C) maximum: (0, 1); minimum: none
D) maximum: (0, 1); minimum: (2, –3)

Find functions f and g so that h(x) = (f ∘ g)(x).

11) $h(x) = \sqrt{59x^2 + 78}$

A) $f(x) = 59x^2 + 78,\ g(x) = \sqrt{x}$
B) $f(x) = \sqrt{x},\ g(x) = 59x^2 + 78$
C) $f(x) = \sqrt{59x^2},\ g(x) = \sqrt{78}$
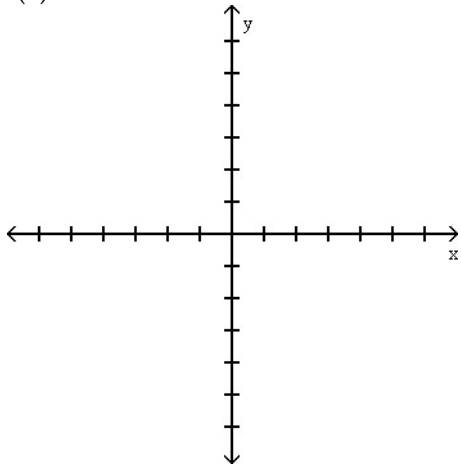D) $f(x) = \sqrt{59x + 78},\ g(x) = x^2$

Find the domain of the composite function f ∘ g.

12) $f(x) = \dfrac{2}{x + 10}$, $g(x) = \dfrac{60}{x}$
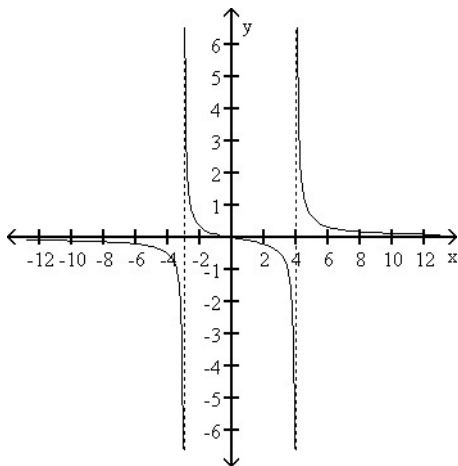
A) $(-\infty, \infty)$

B) $(-\infty, -10)$ or $(-10, 0)$ or $(0, \infty)$

C) $(-\infty, 0)$ or $(0, -6)$ or $(-6, \infty)$

D) $(-\infty, -10)$ or $(-10, -6)$ or $(-6, 0)$ or $(0, \infty)$
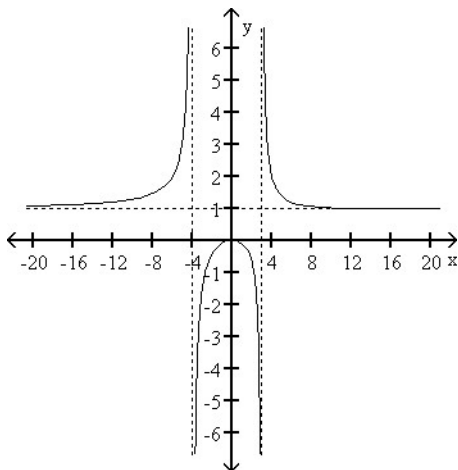
Graph the rational function.

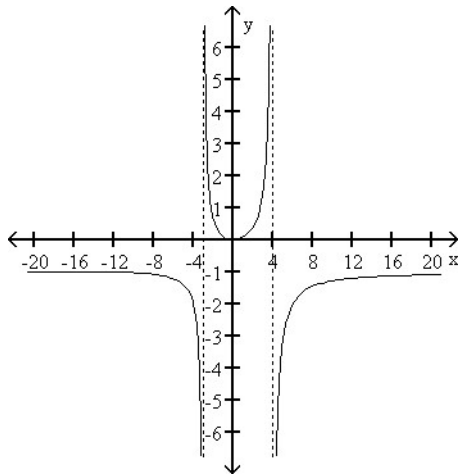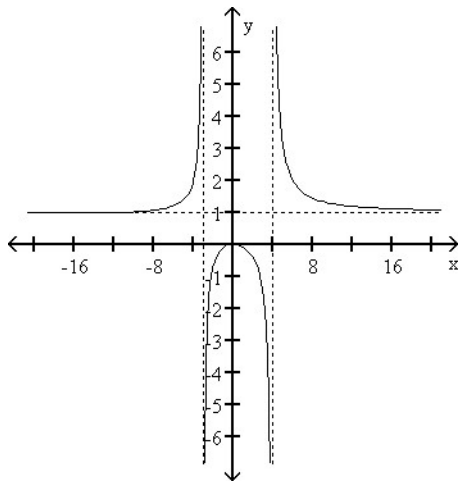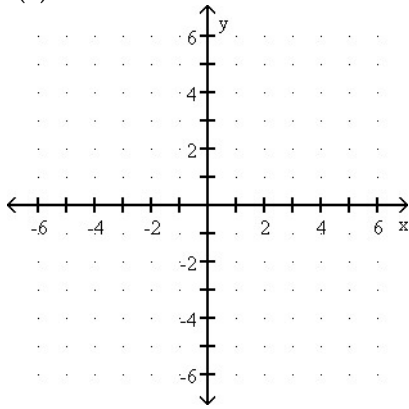13) $f(x) = \dfrac{x^2}{x^2 - x - 12}$

A)

B)

C)

D)

Find a rational zero of the polynomial function and use it to find all the zeros of the function.
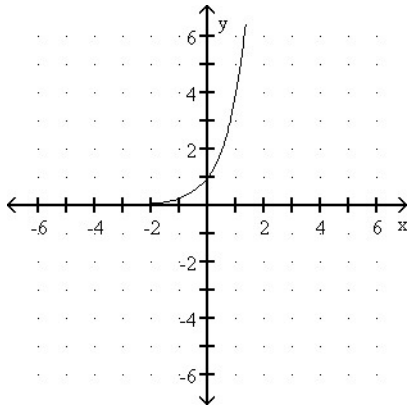
14) $f(x) = 2x^3 - x^2 - 12x + 6$

A) $\{\frac{1}{2}, \sqrt{6}, -\sqrt{6}\}$

B) $\{-2, \sqrt{6}, -\sqrt{6}\}$

C) $\{2, \sqrt{6}, -\sqrt{6}\}$

D) $\{-\frac{1}{2}, \sqrt{6}, -\sqrt{6}\}$

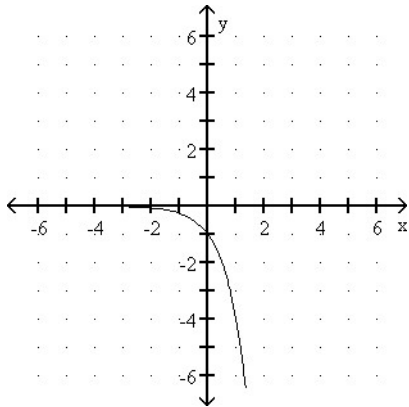**Graph the function by making a table of coordinates.**
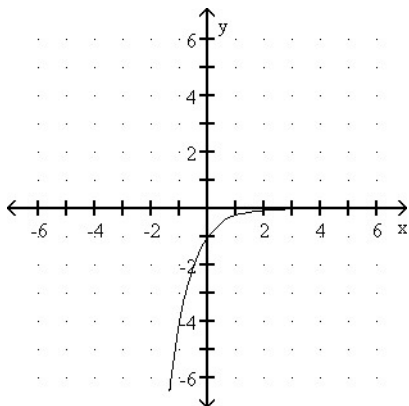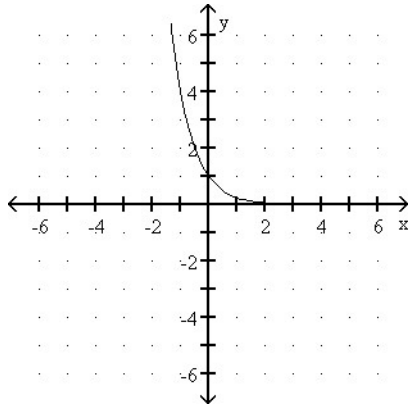
15) $f(x) = 4^x$

A)

B)

C)

D)

Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

16) $\frac{1}{6}(\log_2 x + \log_2 y) - 2\log_2 (x + 9)$

    A) $\dfrac{\sqrt[6]{x} + \sqrt[6]{y}}{\log_2 (x + 9)^2}$

    B) $\dfrac{\sqrt[6]{xy}}{\log_2 (x + 9)^2}$

    C) $\dfrac{\sqrt[6]{xy}}{\log_2 2(x + 9)}$

    D) $\dfrac{\sqrt[6]{x + y}}{\log_2 (x + 9)^2}$

Find the product.

17) $(10 + 7x)^2$

    A) $100 + 140x + 49x^2$

    B) $100 + 49x^2$

    C) $100 + 140x + 7x^2$

    D) $100x^2 + 140x + 49$

Solve the problem.

18) The equation $V = -2000t + 20{,}000$ describes the value in dollars of a certain model of car after it is t years old. If a car is worth $ 12,000, substitute 12,000 into the equation to find the age of the car.

    A) 5 years

    B) 4 years

    C) 3 years

    D) 6 years

Find the inverse of the one–to–one function.

19) $f(x) = \sqrt[3]{x - 6}$

    A) $f^{-1}(x) = x^3 + 6$

    B) $f^{-1}(x) = x + 6$

    C) $f^{-1}(x) = \dfrac{1}{x^3 + 6}$

    D) $f^{-1}(x) = x^3 + 36$

Use synthetic division to show that the number given to the right of the equation is a solution of the equation, then solve the polynomial equation.

20) $x^3 + 2x^2 - 11x - 12 = 0; \; -4$

    A) { 3, 1, −4}

    B) { 3, −1, −4}

    C) { −3, 1, −4}

    D) { −3, −1, −4}

Evaluate or simplify the expression without using a calculator.

21) $\log \; 0.0001$

    A) $\dfrac{1}{4}$

    B) $-\dfrac{1}{4}$

    C) −4

    D) 4

Find the product.

22) $(9x - 8)^2$

    A) $81x^2 + 64$

    B) $9x^2 + 64$

    C) $9x^2 - 144x + 64$

    D) $81x^2 - 144x + 64$

Determine the constant that should be added to the binomial so that it becomes a perfect square trinomial. Then write and factor the trinomial.

23) $x^2 - 4x$

    A) $16; \; x^2 - 4x + 16 = (x - 4)^2$

    B) $-4; \; x^2 - 4x - 4 = (x - 2)^2$

    C) $-16; \; x^2 - 4x - 16 = (x - 4)^2$

    D) $4; \; x^2 - 4x + 4 = (x - 2)^2$

Determine whether the equation defines y as a function of x.

24) $xy + 5y = 1$

    A) y is a function of x

    B) y is not a function of x

Determine whether the graph of the polynomial has y–axis symmetry, origin symmetry, or neither.

25) $f(x) = 7 - x^4$

    A) origin symmetry

    B) y–axis symmetry

    C) neither