NAME _____ Rec. Instr. _____

Signature _____ Rec. Day/Time _____

College Algebra, MATH 100 – EXAM 1
September 11, 2007

<u>Show all work</u> for full credit. You may use a calculator. No books or notes allowed. You should use your graphing calculator on problem 15. For the other problems, you should use your calculator only to check your answers.

(6 pts.) 1. Simplify. $(3x^2y^3)^2(-2xy)^3$

(5 pts.) 2. Subtract. $(3x^2 - 5x + 2) - (2x^2 - 7x - 3)$

(6 pts.) 3. Expand (multiply). $(2x^2y - 3)^2$

(6 pts.) 4. Simplify. $\sqrt{125} - \sqrt{20}$

(5 pts.) 5. Find the slope of the line passing through the two points $(-1, 7)$ and $(4, -3)$.

(5 pts.) 6. Simplify. $\sqrt{18x^3y^6}$

(7 pts.) 7. Subtract. $\dfrac{3x}{2x+1} - \dfrac{x-1}{x-2}$

(12 pts.) 8. Factor completely.

(a) $8x^3y^4 - 4x^4y^2$

(b) $8x^3 - 50x$

(5 pts.) 9. Find the domain of $f(x) = \dfrac{\sqrt{x}}{x-6}$.

(7 pts.) 10. Rationalize the denominator. $\dfrac{5-3\sqrt{3}}{1-\sqrt{3}}$

(7 pts.) 11. The two points $(-4,-2)$ and $(2,6)$ are the endpoints of a diameter of a circle. Find an equation for this circle.

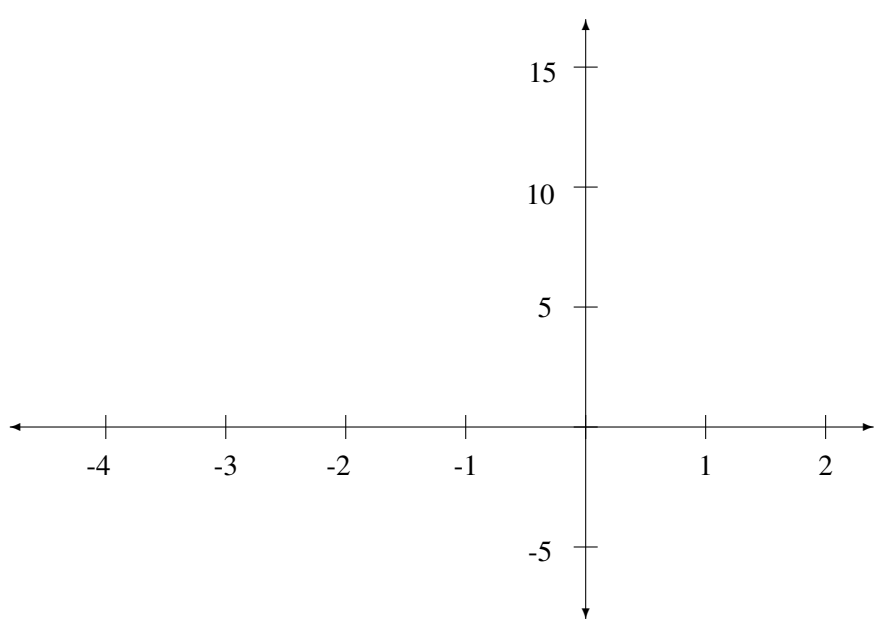
(7 pts.) 12. Factor $x^2+2x-24$.

(5 pts.) 13. Use fractional exponents to simplify. $\dfrac{\sqrt[3]{x^2}}{\sqrt{x}}$

(9 pts.) 14. Divide, factor, and simplify. $\dfrac{3x-3}{x^2+2x} \div \dfrac{x^2-1}{x^2+4x+4}$

(8 pts.) 15.(a) Use your calculator to graph $y = x^3 + 3x^2 + 5$ using the window $-4 \le x \le 2$ and $-5 \le y \le 15$.

(b) Use your calculator to find the x-intercept (the point where $y = 0$). Briefly describe what method you use (which buttons you push).



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College Algebra, MATH 100 – EXAM 1
October 9, 2007

<u>Show all work</u> for full credit. No books or notes allowed. You should use your graphing calculator on problem 14. For the other problems, you should use your calculator only to check your answers.

(5 pts.) 1. Solve the equation $3(4x-5)-2(5x-3)=4(3x-1)$.

(5 pts.) 2. Does the graph of the function $y=\dfrac{x^5}{x^6+1}$ have any symmetry? Explain.

(5 pts.) 3. For $f(x)=x^2-3x$ and $g(x)=2x+1$, find and simplify the composition $(f\circ g)(x)$.

(5 pts.) 4. Write the complex number in the form $a+bi$. $\dfrac{7+4i}{2-i}$.

(6 pts.) 5. Find an equation of the line which passes through the point $(2, 3)$ and which is perpendicular to the line $2x - 6y = 5$.

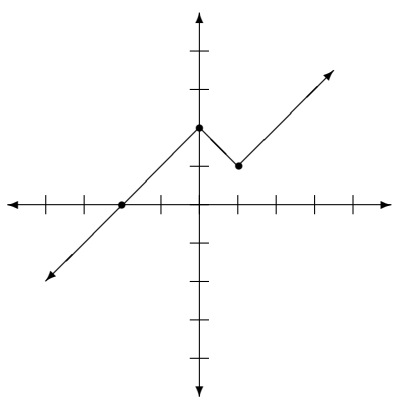
(7 pts.) 6. State the Quadratic Formula, and use it to find all solutions of the equation $x^2 - 4x = 2$.

(8 pts.) 7. A truck leaves a rest stop on the highway at 12:00 noon, and a car leaves the rest stop at 12:30. At 3:30 the car passes the truck. Assume that the vehicles are travelling at constant speeds, and that the speed of the car is 10 miles per hour greater than the speed of the truck. Find the speeds of the two vehicles.

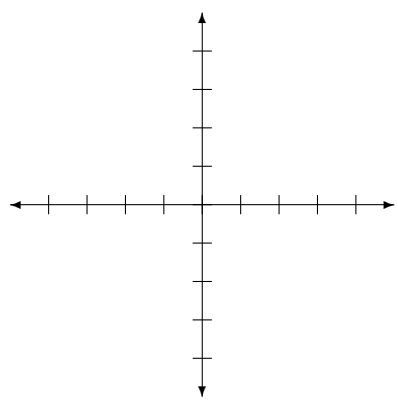
(6 pts.) 8. Solve for h if $A = 2\pi rh + 2\pi r^2$.

(8 pts.) 9. Solve the equation $\dfrac{2}{x-2} - \dfrac{1}{x+3} = \dfrac{6}{x^2+x-6}$.

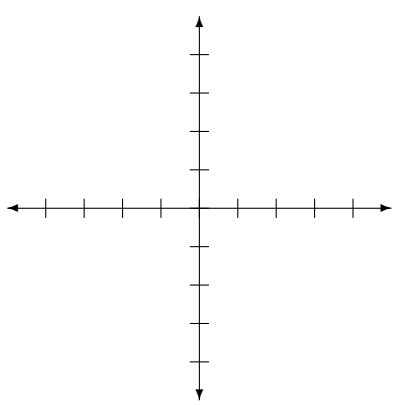
(9 pts.) 10. The graph of a function $f(x)$ is given below. Give the graphs of $g(x) = f(x+2)$, $h(x) = -f(x+2)$, and $k(x) = 3 - f(x+2)$.



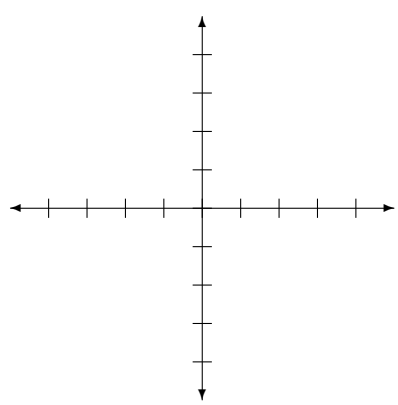
$f(x)$



$g(x) = f(x+2)$



$h(x) = -f(x+2)$



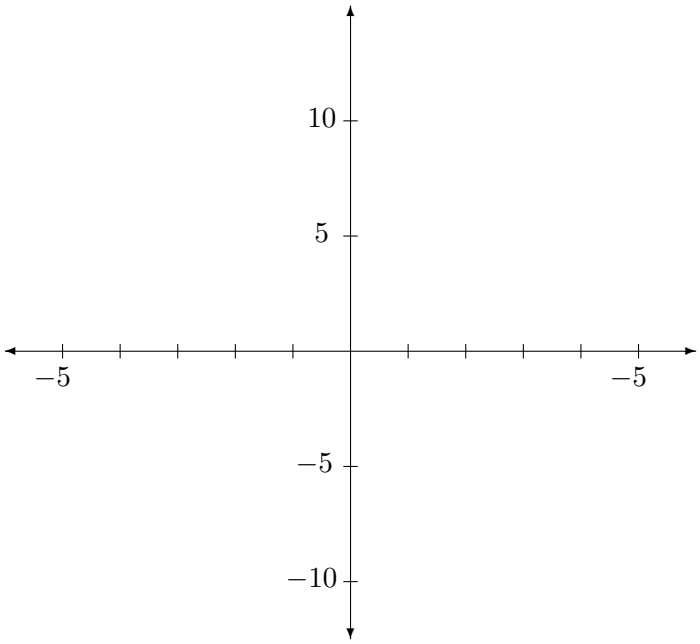
$k(x) = 3 - f(x+2)$

(10 pts.) 11. The curve defined by $y = 5 - 4x - x^2$ is a parabola.

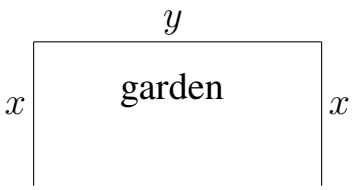
(a) Give the x- and y-coordinates of the vertex of this parabola.

(b) Find the x-intercepts.

(c) Graph the parabola.



(9 pts.) 12. A rectangular garden has an area of 300 square meters, and is fenced on all three sides with 50 meters of fence. Show that there are two possibilities for the length and width of the garden.

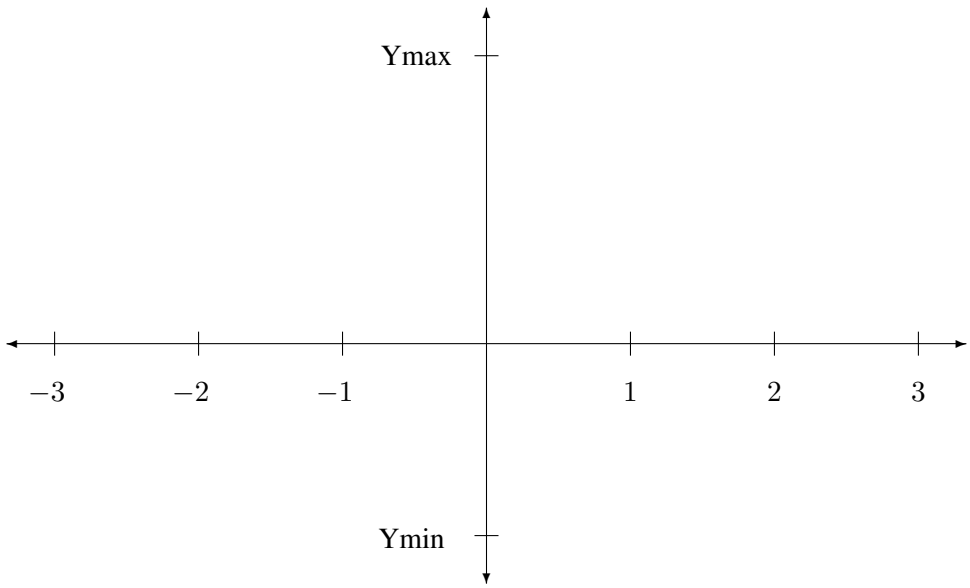


(8 pts.) 13. Solve the equation, and check your answers.

$$\sqrt{x+5} = x - 1$$

(9 pts.) 14. Use your graphing calculator to graph the function $y = 2x^3 - 3x^2 - 12x + 23$ over the interval $-3 \leq x \leq 3$

(a) Use ZoomFit to set the y-values of the window. Give the resulting values of Ymin and Ymax.



(b) Give the interval (x-coordinates) where the function is decreasing.

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College Algebra, MATH 100 – EXAM 3
November 6, 2007

<u>Show all work</u> for full credit. No books or notes allowed. You should use your graphing calculator on problems 9(c) and 12(a). For the other problems, you should use your calculator only to check your answers.

(7 pts.) 1. Solve the inequality $|x+4| > 3$.

(7 pts.) 2. Use synthetic division to evaluate $f(2)$ for $f(x) = 2x^3 - 3x^2 + 5x - 8$.

(10 pts.) 3. Let

$$y = \frac{4x^2 - 9}{x^2 - x - 6}\ .$$

(a) Find all vertical asymptotes.

(b) Find the horizontal asymptote.

(6 pts.) 4. Use the leading-term test to determine the end behavior (where $|x|$ is large) for $y = 7x^2 - 3x^5$.

(6 pts.) 5. Use the Rational Zeros Theorem to list all possible rational zeros of $y = 2x^3 - 5x^2 - 2x + 15$.

(8 pts.) 6. Use long division to find the oblique (slant) asymptote of

$$y = \frac{4x^3}{x^2 + 2x - 3}\,.$$

(6 pts.) 7. Evaluate the function $f(x) = 2x^3 - 4x^2 + 1$ at the x-coordinates $x = -1, 0, 1$ and 2. Explain what this implies about the x-intercepts of the function.

(10 pts.) 8. Solve the inequality.

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

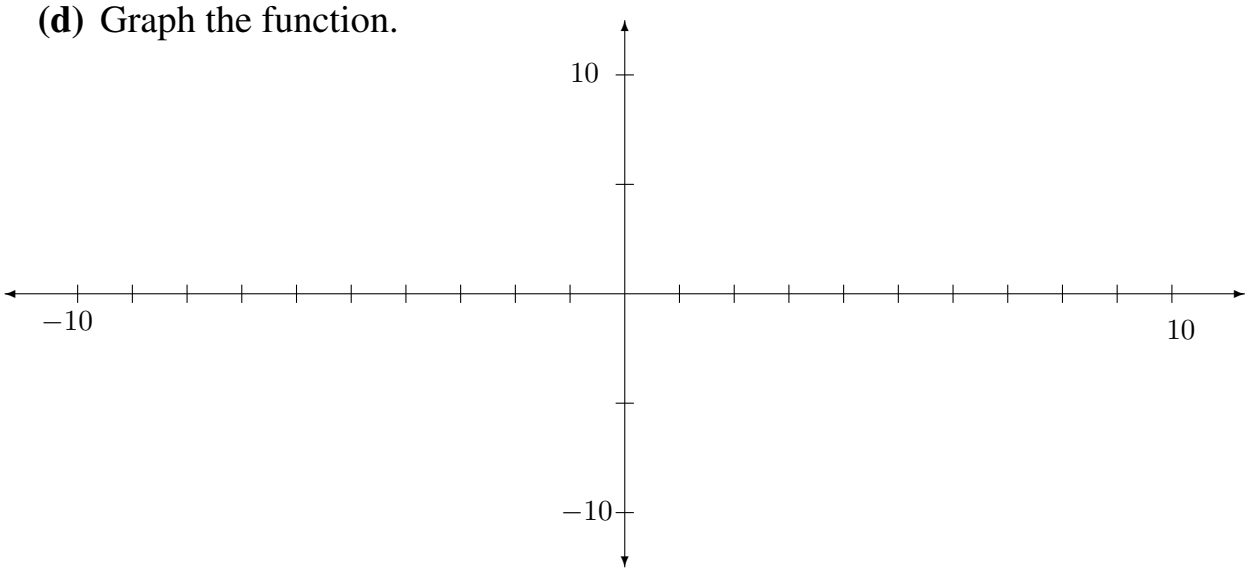
(13 pts.) 9. Let $y = 5 - e^{x-2}$.

(a) Find the horizontal asymptote.

(b) Give the y-coordinate of the point where $x = 2$.

(c) Use your graphing calculator to find the x-intercept and the y-intercept.

(d) Graph the function.

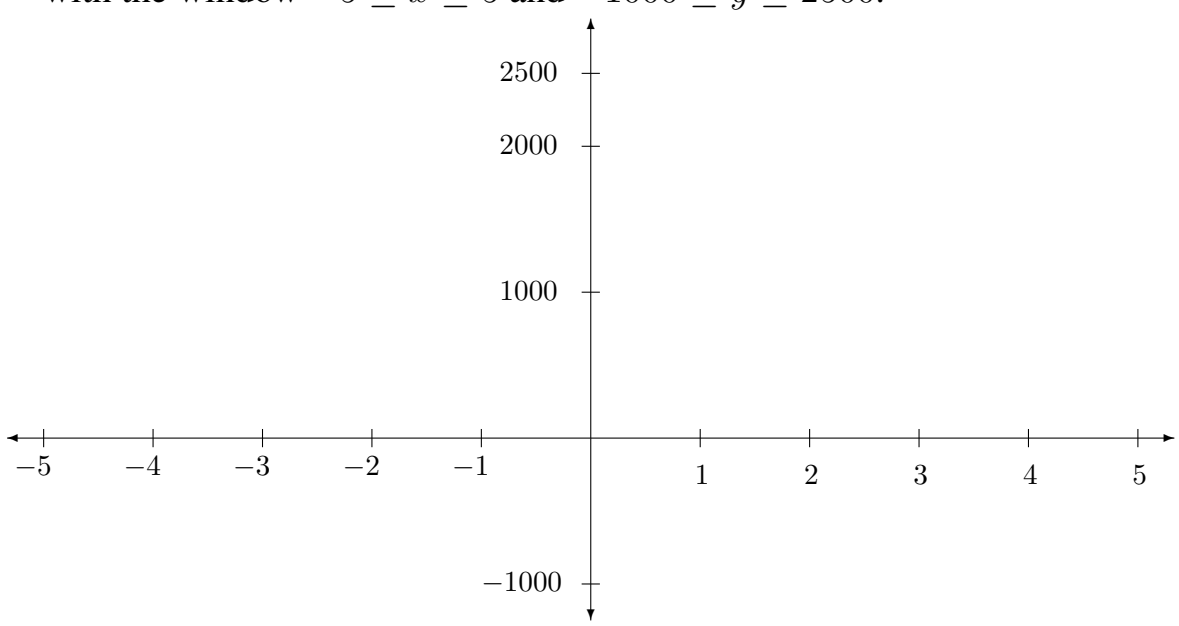


(7 pts.) 10. Find a quadratic function with real coefficients with $3 - 2i$ as one of its zeros.

(10 pts.) 11. Solve the inequality $6x^3 > x^4 + 8x^2$.

(10 pts.) 12.

(a) Use your graphing calculator to graph the function $y = x^5 - 40x^4 - 50x^3 + 500x^2$ with the window $-5 \leq x \leq 5$ and $-1000 \leq y \leq 2500$.



(b) Discuss the important features of the graph of this function that are missing from this window.

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College Algebra, MATH 100 – FINAL EXAM
December 12, 2007

<u>Show all work</u> for full credit. No books or notes allowed. You should use your graphing calculator on problems 12 and 15. For the other problems, you should use your calculator only to check your answers.

page	1	2	3	4	5	6	7	Total
points								

(7 pts.) 1. Solve the equation.

$$(2x+1)(3x-2) = (6x+4)(x-1)$$

(7 pts.) 2. Solve the inequality.

$$|3x-2| < 4$$

(9 pts.) 3. Find the dimensions of a rectangular garden if the length is two meters greater than the width, and the perimeter is 20 meters.

(21 pts.) 4.

(a) Use the Rational Zeros Theorem to list all possible rational zeros of the function $y = 2x^3 + 11x^2 + 14x - 10$.

(b) Use long division to find the quotient.

$$\frac{2x^3 + 11x^2 + 14x - 10}{2x - 1} =$$

(c) Use the Quadratic Formula to find the solutions to $x^2 + 6x + 10 = 0$.

(9 pts.) 5. Solve the equation.

$$3x^6 - 15x^4 + 12x^2 = 0$$

(10 pts.) 6. Solve the inequality.

$$x^3 + x^2 \geq 6x$$

(10 pts.) 7. Use the method of substitution to solve the system of equations.

$$\{x^2 + y^2 = 25\ ,\ x - y = 1\}$$

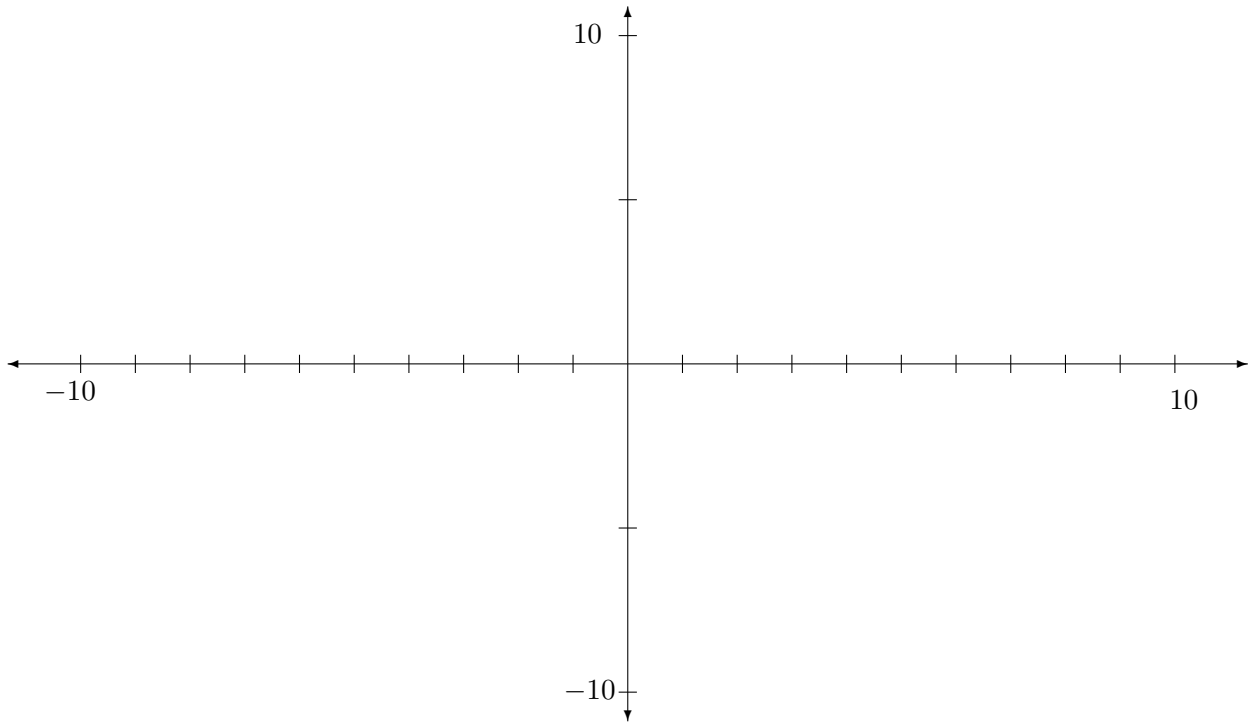
(9 pts.) 8. Solve the equation $\log_2(x+3) + \log_2(x+1) = 3$.

(24 pts.) 9. Graph the function $y = \frac{2x^2-50}{x^2-9}$ after determining the following features of the graph.

(a) Find all intercepts.

(b) Give equations of all asymptotes.

(c) Determine any symmetry. Explain.



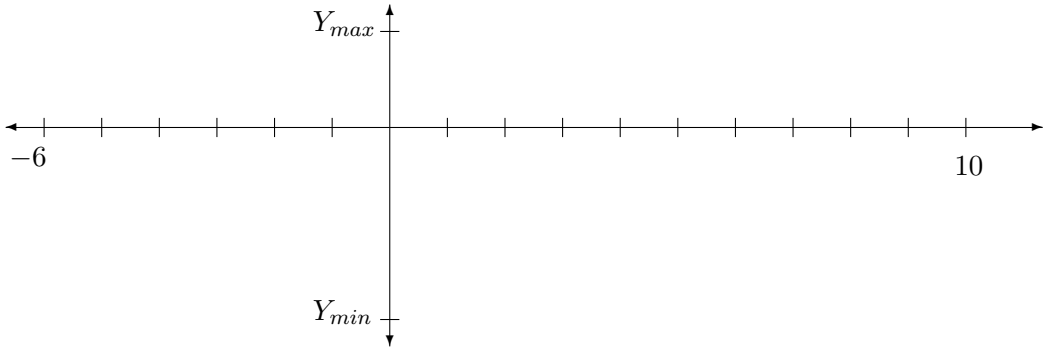
(7 pts.) 10. Without using a calculator, compute $\log_9(27)$.

(9 pts.) 11. Solve the equation.

$$\frac{4}{x-2} + \frac{5}{x+1} = 3$$

(14 pts.) 12.

(a) Use your graphing calculator to graph the function $y = 2x^3 - 9x^2 - 60x - 189$ with the window $-6 \leq x \leq 10$. Use ZOOMFIT to set the y-window, and give the resulting window settings Ymin and Ymax.



(b) Find the interval (x-coordinates) where the function is decreasing.

(c) Find the x-intercept.

(8 pts.) 13. Find the x- and y-coordinates of the vertex of the parabola $y = 3 - 2x - x^2$.

(9 pts.) 14. A population of bacteria doubles every 8 hours, and initially there are 100 bacteria. When will there be 6400 bacteria?

(14 pts) 15. Use your graphing calculator to solve the system of equations using the following two methods.

$$\{\, x + y - z = 5 \,,\; x + 2y + z = 3 \,,\; 2x + 3y + z = 6 \,\}$$

(a) Give the augmented matrix, and find the reduced row echelon form.

(b) Find the inverse matrix for the coefficient matrix, and then multiply by the appropriate column matrix.

(7 pts.) 16. Simplify $\sqrt{32x^5y^8}$.

(7 pts.) 17. Find an equation of the line which passes through the point $(1, -2)$ and which is perpendicular to the line $2x - 4y = 5$.

(9 pts.) 18. Solve the equation.

$$x = \sqrt{2x + 3}$$

(10 pts.) 19. Find the speed of the current of a river, and the speed of a boat in still water, if the boat travels two miles downstream in 12 minutes and two miles upstream in 20 minutes.