Your Name (print clearly)

Thursday, October 8

Page	Total Points	Score
1	20	
2	20	
3	15	
4	20	
5	10	
6	15	
Total	100	

Instructions and information:

- Please turn off cell phones or any other thing that will go BEEP.
- Calculators are **not** allowed on this test.
- Read the directions for each problem. You must always show your work to receive partial credit.
- Be wary of doing computations in your head. Instead, write out your computations on the exam paper.
- If you need more room, use the backs of the pages and indicate to the grader where to look.
- Raise your hand (or come up to the front) if you have a question.

1. (5 points) Find all real solutions of $3x^2 - 4x - 6 = 0$ by completing the square.

Answer:_____

2. (5 points) Simplify the compound fraction $\frac{1+\frac{1}{x+1}}{2-\frac{1}{x+1}}$.

Answer:_____

3. (5 points) Simplify the rational expression $\frac{x^3-x}{3x^2+5x+2}$.

Answer:_____

4. (5 points) Factor the expression $4(x+3)^{1/2} - 2(x+3)^{-1/2}$ completely by factoring out the lowest power of each common factor.

Answer:_____

5. (5 points) Simplify the expression below and and eliminate any negative exponents.

$$\left(\frac{4x^{2/3}}{y^{-1/3}}\right)^2 \frac{1}{xy}$$

Answer:_____

6. (5 points) Multiply and simplify $x^{1/5}(x^{4/5} - x^{9/5})$.

Answer:_____

7. (5 points) Factor $8 - 125y^3$.

Answer:_____

8. (5 points) Use the discriminant to determine the number of real solutions to $3x^2 = x - \frac{5}{3}$.

Answer:_____

9. (5 points) Erika bikes 10 mi/hr faster than she runs. Every morning she bikes 11 miles and runs 3.2 miles for a total of 1 hour of exercise. Let r represent how fast Erika runs (measured in mi/hr). Write an equation containing r that can be used to solve for r. *You do not need to solve for r.* You should use the *units* in this problem to help you write the equation.

Answer:_____

10. (5 points) Find all real solutions of $x^6 - 7x^3 - 8 = 0$.

Answer:_____

11. (5 points) Find the domain of the function $f(x) = \frac{(x+1)^3}{\sqrt{1-3x}}$.

Answer:_____

12. (4 points) Write an equation for a circle with center $(3, -20)$ and radius 4.

Answer:_____

13. (5 points each) Solve the inequalities below. Express your solutions using interval notation.

(a) $15 - |3x + 1| > 2$.

Answer:_____

(b) $\frac{8}{x-1} \geq \frac{8}{x}$.

Answer:_____

14. (6 points) Write an equation of a line through $(2, -5)$ perpendicular to the line $4x - y = 14$.

Line:_____

15. (2 points each) Use $g(x) = 3x - 2$ to find the expressions below. You do NOT need to simplify your answers.

(a) $g(\frac{x}{2})$

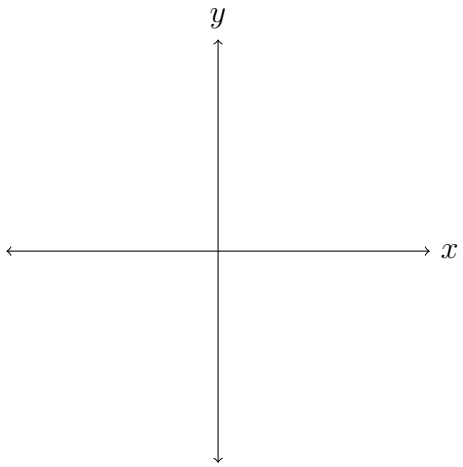
Answer:_____

(b) $g(x + 5)$

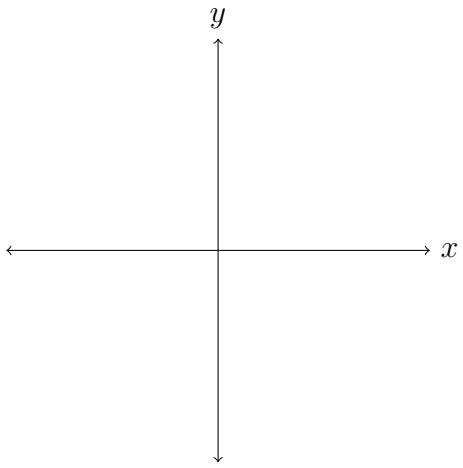
Answer:_____

16. (3 points each) Sketch the graphs of the functions below. You do not have to make a table but you must plot at least two points on the graph.

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



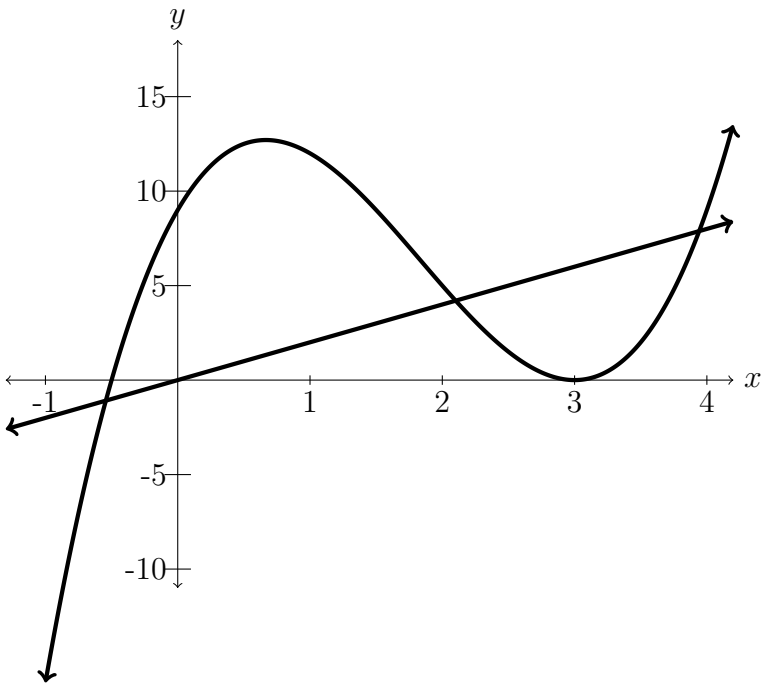
(b) $y = |x|$



17. (5 points) Find the average rate of change of the function $f(x) = x^2 + 1$ from $x = a$ to $x = a + h$.

Answer:_____

18. (10 points) Below is graphed the function $f(x) = (x-3)^2(2x+1)$ and the line $y = 2x$. Use the graphs to answer questions (a) through (e).



(a) Estimate $f(1)$. Answer:_____

(b) Estimate the y-intercepts of $f(x)$. Answer:_____

(c) Estimate the x-intercepts of $f(x)$. Answer:_____

(d) Find solutions to the inequality $(x-3)^2(2x+1) > 2x$ Answer:_____

(e) Find the open interval(s) on which $f(x)$ is increasing.

Answer:_____