

Last Name: \_\_\_\_\_, First Name: \_\_\_\_\_

Final Exam, College Algebra, Fall 2006

**Please include all the work on the test pages provided.**

1. (5 points) *Solve the next inequality and express your answer using set notation or interval notation:*

$$4x^2 + 4x - 3 > 0.$$

*Answer :* \_\_\_\_\_

2. (5 points) *Find all solutions of the following equation:*

$$\frac{2 - 5x}{3} + \frac{x - 1}{15} = 1.$$

*Answer :* \_\_\_\_\_

3. (5 points) Solve the inequality below and express your answer using set notation or interval notation:

$$\frac{2x - 5}{x + 3} \leq 0.$$

*Answer :* \_\_\_\_\_

4. (5 points) Given that  $x = 2$  is a zero of the polynomial  $P$ , find all remaining zeros if

$$P(x) = x^3 - 3x^2 + 4x - 4.$$

Answer : \_\_\_\_\_

5. (5 points) Find the coordinates of the center and the radius of the circle of equation

$$x^2 + y^2 - 6x + 10y = 87.$$

Answer : \_\_\_\_\_

6. (5 points) Solve the following logarithmic equation for  $x$ :

$$\log_{16}(3x - 5) = \frac{3}{2}.$$

Answer : \_\_\_\_\_

7. (5 points) Solve the exponential equation:

$$2^{3-2x} = \frac{1}{32}.$$

Answer : \_\_\_\_\_

8. (5 points) Find the rule of the function that is finally graphed after the following transformations are applied to the graph of the function  $g$  given by  $g(x) = 3x - 2$ :

- (a) shifted to the left 3 units,
- (b) reflected about the  $x$  axis,
- (c) shifted up 2 units.

**(Simplify your answers and include the intermediary steps for full credit!)**

9. (5 points)

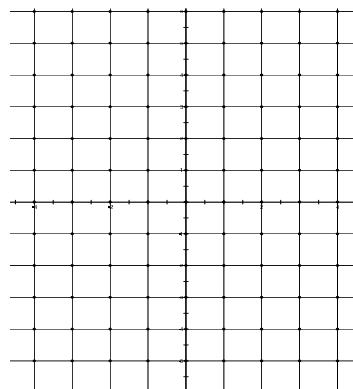
(a) Plot the piecewise defined function

$$g(x) = \begin{cases} x + 3 & \text{if } -3 < x < -2 \\ 1/2 & \text{if } -2 \leq x \leq 2 \\ 3 - x & \text{if } 2 < x < 4 \end{cases}$$

in the space provided.

(b) Calculate  $g(1) - g(-3)$ .

(c) Find the range and the domain of  $g$ .



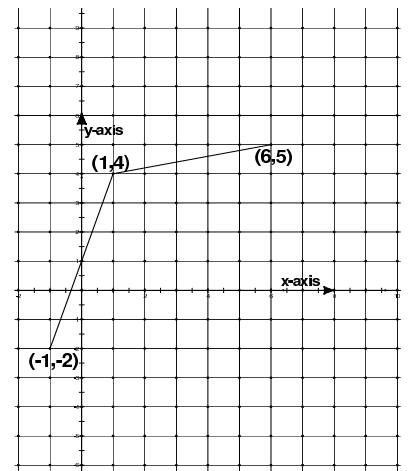
10. (5 points) Find the domain of the function given by the rule  $h(x) = \frac{\sqrt{2-3x}}{x+1}$  and express your answer using set notation or interval notation.

Answer : \_\_\_\_\_

11. (5 points) The function  $f(x) = \frac{2x-1}{x+3}$  is one-to-one on its implicit domain. Find its inverse.

Answer : \_\_\_\_\_

12. (5 points) The graph of a one-to-one function,  $f$ , is provided. Draw the graph of the inverse function  $f^{-1}$  on the same system of coordinates.



13. (5 points) For the two functions,  $u$  and  $v$ , defined on their implicit domain, by  $u(x) = 3x^2 - 2$  and  $v(x) = \sqrt{1 - 2x}$ , find
- the rule (in simplified form) of the composition  $u \circ v$ ,
  - the domain of  $u \circ v$ .

14. (5 points) Given the function  $g(x) = 1 - x - x^2$ , find the average rate of change of  $g$  from 2 to  $a$ :  $\frac{g(a) - g(2)}{a - 2}$  and write it in a simplified form.

Answer : \_\_\_\_\_

15. (5 points) Solve the inequality and express your answer using set notation or interval notation:  $|3x + 1| \leq 2$ .

Answer : \_\_\_\_\_

16. (5 points) Determine the asymptotes of the rational function

$$R(x) = \frac{2x^2 + 1}{x^2 - 16}.$$

Answer : \_\_\_\_\_

17. (5 points) A rectangular garden is three times as long as it is wide and has an area of  $A$  square feet. If  $x$  feet of fencing is necessary to surround this garden what is the rule of  $A$  as a function of  $x$ ?

Answer : \_\_\_\_\_

18. (5 points) Expand the following expression and write your answer as a polynomial in standard form:

$$(x^2 - 2x + 1)(x^2 + 2x + 1).$$

Answer : \_\_\_\_\_

19. (5 points) Complete the following formulae:

(a)  $x^2 - y^2 =$

(b)  $\sqrt[n]{x^m} = x^{\quad ?}$  ,  $x > 0$ ,  $m, n = 2, 3, \dots$

(c)  $(x^s)(x^t) =$  ,  $x > 0$

(d)  $(x - y)^2 =$

(e)  $\sqrt{a^2} =$

20. (5 points) Solve the following logarithmic equation:

$$\log_{10}(3x - 4) + \log_{10}(x + 1) = 1.$$

Answer : \_\_\_\_\_