

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

Final Exam, College Algebra, Summer 2007

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

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

$$6x^2 - 7x - 5 > 0.$$

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

2. (5 points) 3. (5 points) Given  $f(x) = \frac{2}{3x-2}$  and  $g(x) = \frac{x+1}{5}$ , find  $(fg)(1)$ ,  $(f/g)(2)$  and  $f(3) - g(3)$ .

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

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

$$\frac{3x+7}{x+2} < 0.$$

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

4. (5 points) Given that  $x = \frac{-1}{2}$  is a zero of the polynomial  $P$ , find all remaining zeros if

$$P(x) = 2x^3 + 5x^2 - 4x - 3.$$

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

5. (6 points) Write the function  $f(x) = 2x^2 - 4x + 7$  in the form  $f(x) = a(x - h)^2 + k$ .

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

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

$$\log_9(4x - 5) = \frac{3}{2}.$$

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

7. (5 points) Solve the exponential equation:

$$2^{2-3x} = \frac{1}{128}.$$

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

8. (5 points) Find the rule of the function that is finally graphed after the following three transformations, in the order (a) – (b) – (c), are applied to the graph of the function  $g$  given by  $g(x) = 5 - 3x$  (simplify your answer at each intermediary step):

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

9. (6 points)

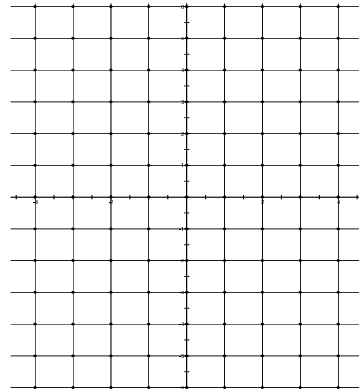
(a) Plot the piecewise defined function

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

in the space provided.

(b) Calculate  $g(2) - g(-2)$ .

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



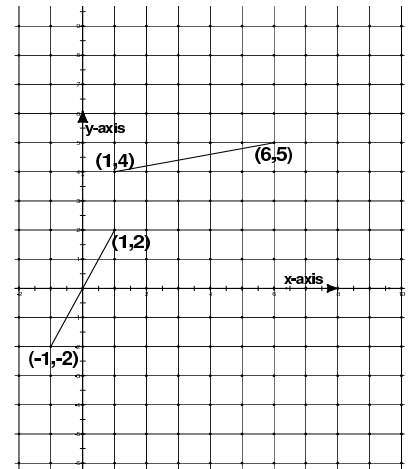
10. (5 points) Find the domain of the function given by the rule  $h(x) = \frac{\sqrt{1+5x}}{2x+1}$  and express your answer using set notation or interval notation.

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

11. (5 points) The function  $f(x) = \frac{2x-3}{x-5}$  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  $u(x) = 2x^2 - 1$  and  $v(x) = \sqrt{1 + 2x}$ , find
- (a) the rule (in simplified form) of the composition  $u \circ v$ ,
  - (b) the domain of  $u \circ v$ .

14. (6 points) Given the function  $g(x) = 2x - x^2$ , find the average rate of change of  $g$  from 2 to  $a$  (which is to say  $\frac{g(a) - g(2)}{a - 2}$ ,  $a \neq 2$ ) and write it in a simplified form.

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

15. (5 points) Form a polynomial  $P$  of degree three having a zero of multiplicity 2 at  $x = 3$ , a simple zero at  $x = -2$ , and  $P(-1) = 32$ . Write your answer in the standard form.

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

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

$$R(x) = \frac{2x^2 + 5}{x^2 - 100}.$$

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

17. (6 points) A circular garden has a circumference that is fifty feet longer than its diameter. Find its area in square feet.

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

18. (5 points) The polynomial  $Q(x) = x^3 - 3x^2 + x + 5$  has a complex zero:  $x = 2 + i$ . Find all the other zeroes of  $Q$ .

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

19. (6 points) *Solve the following logarithmic equation:*

$$\log_5(4x + 1) - \log_5(x - 1) = 1.$$

20. **Bonus:** (10 points) *The two quartic equations*

$$x^4 - x^3 - x - 1 = 0 \quad \text{and} \quad x^4 + x^3 + x - 1 = 0$$

*have two complex solutions in common. Find them.*

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