

Last Name: _____ , First Name: _____

Final Exam, College Algebra, Spring 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) *Find all solutions of the following equation:*

$$\frac{2 - 3x}{3} + \frac{x - 3}{21} = 1.$$

Answer : _____

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

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

Answer : _____

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

$$P(x) = 2x^3 + 3x^2 - 8x + 3.$$

Answer : _____

5. (6 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 :

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

Answer : _____

7. (5 points) Solve the exponential equation:

$$2^{2-3x} = \frac{1}{16}.$$

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 $g(x) = 3 - 2x$ (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)

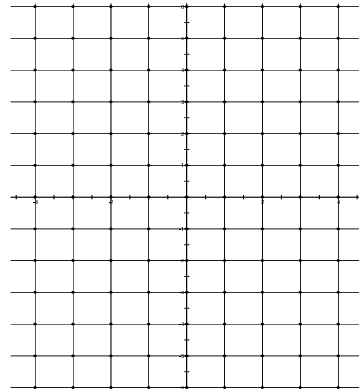
(a) Plot the piecewise defined function

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

in the space provided.

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

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



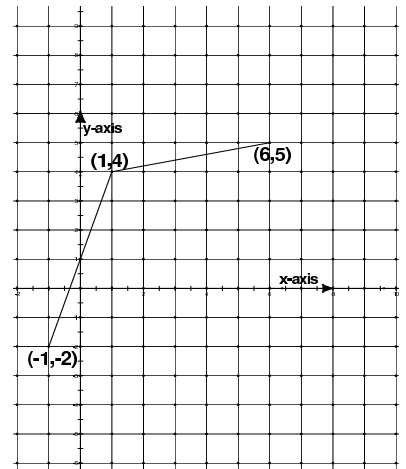
10. (5 points) Find the domain of the function given by the rule $h(x) = \frac{\sqrt{2+3x}}{x+1}$ and express your answer using set notation or interval notation.

Answer : _____

11. (5 points) The function $f(x) = \frac{2x+3}{x-1}$ 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
- (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 $g(x) = x - x^2$, 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) Solve the inequality and express your answer using set notation or interval notation: $|3x - 10| \leq 2$.

Answer : _____

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

$$R(x) = \frac{3x^2 + 2}{x^2 - 16}.$$

Answer : _____

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

Answer : _____

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

$$(x^2 + x + 1)(x^4 - x^3 - x + 1).$$

Answer : _____

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

$$\log_{10}(2x + 14) - \log_{10}(x - 1) = 1.$$

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

$$x^4 + x^2 + 1 = 0 \quad \text{and} \quad x^4 + 2x^3 + x^2 - 1 = 0$$

have two complex solutions in common. Find them.

Answer : _____