

College Algebra Sec 4 Final Exam Review

1. Solve the quadratic equations  $x^2 - 8x + 7 = 0$  and  $2x^2 - 4x = -6$  by completing the square.

2. Simplify the following

a)  $\frac{x^2 - 25}{\frac{x^2 - x}{2x - 10}}$     b)  $\sqrt[3]{\frac{16x^4}{27y^2}}$     c)  $\left(\frac{2x^4y^2}{8x^5z}\right)^2$     d)  $5^{\log_5(3)}$     e)  $(3x^2 - y)(-x - y)$

f)  $\left(\frac{12x^4}{x^{-3}z}\right)^{-1}$     g)  $(4x - 5y)(x + xy - y)$     h)  $(3x^3 - 4x) - (x^4 + x^3 - 1)$

3. Given two functions  $f(x) = 3x - 5$  and  $g(x) = x^2$

a) Find  $(f \circ g)(x)$  and  $(g \circ f)(x)$

b) Find  $f(r^2)$  and  $g(-3)$

c) One of the above functions has an inverse, and one does not. For the function with an inverse, find it. For the function without an inverse, explain why it can not have an inverse.

d) Write the equation of a line which would be parallel to the graph of  $f(x)$ .

4. Solve the following for x:  $\sqrt{x+2} - 1 = 4x$

5. Solve the following for y:  $\frac{y+1}{2} - 1 = 4y + 1$

6. Solve the following for x:  $8x^{\frac{5}{3}} - 24 = 0$

7. Find and simplify the difference quotient  $\frac{f(x+h) - f(x)}{h}$  for the following

functions

a)  $f(x) = 2x + 1$

b)  $f(x) = x^2 + 2x - 1$

c)  $f(x) = \frac{1}{x}$

8. Use the rational root theorem to list all possible rational zeros of  $f(x) = x^3 - 5x^2 + 17x - 13$  and then find all actual zeros.

9. Solve the system of equations using a) the substitution method and b) addition method.

$$x = 9 - 2y$$

$$x + 2y = 13$$

10. Find all values of  $x$  where  $\frac{x-5}{x+1} \geq 0$ . Write your solution in interval notation.

11. Sketch the graphs of two equations where the following is true:

a) The system of the two equations has exactly one solution

b) The system of the two equations has no solutions

12. Find the following without a calculator. Be sure to show why each is true.

a)  $2^{-4}$     b)  $\log_3 \frac{1}{\sqrt{3}}$     c)  $3^2 \cdot 3^{-3}$     d)  $\log_2 16$     e)  $\log_2 1$     f)  $\ln(e^{27})$

g)  $\left(\frac{2^{24}}{4^6}\right)^0$     h)  $-[3(1-6^2)-2]$

13. Write the equation of a line that passes through the points  $(-5,1)$  and  $(-3,3)$ . Write your answer in slope intercept form.

14. Solve the following for  $x$ :

a)  $3^{x+4} = 7^{2x-1}$     b)  $3 + 4 \ln(2x) = 15$

15. Factor the following completely:

a)  $3x^4 - 27x^2$

b)  $x^3 + x^2 - 4x - 4$

16. What is the domain of the following functions? Give your solution in interval notation.

a)  $f(x) = \ln(x)$

b)  $g(x) = \frac{1}{x}$

c)  $k(x) = \sqrt{x}$

d)  $h(x) = e^x$

17. Sketch a graph of a function that satisfies the following:

a) A quadratic function with a vertex of  $(-2,1)$  and zeros of  $-1$  and  $-3$

b) A polynomial function with 4 real roots

c) A rational function with a vertical asymptote  $x = -1$  and horizontal asymptote  $y = 0$

d) A linear function with undefined slope