Name: _____ Date:

Course: _____ Nyack College

College Algebra

FINAL EXAM

General Directions: Provide complete responses to each question.

1. Factor each the following expressions completely:
   a. $x^3y^3 - 9x^2y^2$
   b. $x^2 - 7x - 18$
   c. $28x^4 + 16x^3 - 80x^2$
   d. $16 - x^4$
   e. $8x^3 - 64x^2 + x - 8$

2. Simplify the following rational expressions:
   a. $\frac{-36x^4}{42x^2}$
   b. $\frac{x+6}{x^2+5x-6}$
   c. $\frac{9x^2+81x}{x^3+8x^2-9x}$
   d. $\frac{5}{x+5} + \frac{4x}{2x+6}$
   e. $\frac{\frac{5}{4}}{\frac{5}{m} - \frac{4}{m}}$

3. Solve for x:
   a. $3x + 12 = 6x + 48$
   b. $\frac{1}{2}(x + 5) - 4 = \frac{1}{3}(2x - 1)$
   c. $(2x + 1)(x - 1) = (2x - 5)(x + 5)$
   d. $\sqrt{x - 7} = x - 7$
   e. $\frac{3x}{x-1} + 2 = \frac{3}{x-1}$

Name: _____ Date:

Course: _____ Nyack College

4. Please complete the following tables:

a.

Equation	Axis of Symmetry	Vertex
$y = x^2 - 20x + 64$		
$y = (x - 7)^2 + 7$		

b.

Equation	Center	Radius
$(x - 6)^2 + (y + 5)^2 = 50$		
$x^2 + y^2 + 4x - 6y - 23 = 0$		

5. Use the point-slope formula to find the equation of the line with the given information.

a. Passes through the points (4, 2) and (-2, 1).	b. Slope is $-\frac{1}{3}$, and passes through (-3, 4)

6. Find the distance and midpoint between the two points. Simplify your answers: (−1, 2) and (4, 6).

Name: _____ Date:

Course: _____ Nyack College

Distance	Midpoint

7. The number of males in the classroom is five more than three times the number of females. If the total number of students is 73, how many of each gender are in the class?

8. Simplify the expression as much as possible: If an answer does not exist, explain why.

a) $8\left(\frac{1}{4}\right) - 10\left(\frac{1}{2}\right)^2 =$	b) $2 \times [16 \div (8-4)^2]^2 =$

Name: _____ Date:

Course: _____ Nyack College

c) $\frac{-110+100}{-55+50} =$	d) $7\left(\frac{1}{21}x^2 - \frac{2}{14}x^2\right)$

9.

Simplify each rational expression.

(a) $\frac{3x^2y}{12xy^3}$

(b) $\frac{x^2-4y^2}{2x+4y}$

(c) $\frac{x^2+4x-5}{x^2+x-2}$

10.

Simplify each rational expression.

(a) $\frac{18x^3y^2}{24xy^3}$

(b) $-\frac{28xz^2-7z}{7x^2z}$

11.

Simplify each rational expression.

(a) $\dfrac{x^2-4x-12}{x^2-x-30}$

(b) $\dfrac{2x^2+3x-5}{3x^2-5x+2}$

12.

Simplify each rational expression.

(a) $\dfrac{4x^2-16}{3x^2-3x-6}$

(b) $\dfrac{xy-5x+3y-15}{xy-5x+4y-20}$

Name: _____ Date:

Course: _____ Nyack College

13.

Find the following product.

$$\frac{x^2+2x-8}{x^2-1}\cdot\frac{x+1}{x+4}$$

14.

Find the following quotient.

$$\frac{x+3}{x-5}\div\frac{x^2-9}{x^2-25}$$

Name: _____ Date:

Course: _____ Nyack College

15.

Perform the following operations. All results should be in simplified form.

(a) $(x+2)\cdot\dfrac{5}{3x+6}$

(b) $\dfrac{2x-10}{3x}\div(x-5)$

16.

Perform the following operations. All results should be in simplified form.

(a) $\dfrac{x}{x^2-4}+\dfrac{2}{x^2-4}$

(b) $\dfrac{x}{x^2-4}-\dfrac{2}{x^2-4}$

Name: _____ Date:

Course: _____ Nyack College

17.

Simplify the following complex fraction.

$$\frac{\frac{2x}{3}+\frac{x}{6}}{\frac{x^2}{12}}$$

18.

Solve and check: $\frac{x}{x+3}+\frac{1}{4}=\frac{x}{2x+6}$

Name: _____ Date:

Course: _____ Nyack College

19. Evaluating composite functions for the following functions:

$$f(x) = 3x + 2 \; and \; g(x) = 2x^2 - 1$$

(a) $(f \circ g)(4)$

(b) $(g \circ f)(2)$

(c) $(f \circ f)(1)$

Name: _____ Date:

Course: _____ Nyack College

20. State the domain for the composite functions given $f \; and \; g$:

$$f(x) = \frac{1}{x+3} \; and \; g(x) = -\frac{2}{x}$$

(a) $(f \circ g)$

(b) $(g \circ f)$

(c) $(f \circ f)$

(d) $(g \circ g)$