

Algebra P4
Practice Test 4

(Part 1: No calculator. Show all work for full credit.)

1. Find any excluded values of each rational function (the domain).

a. $\frac{2m^3}{4m}$

$$m \neq 0$$

b. $\frac{x+7}{3x+12}$

$$x \neq -4$$

c. $\frac{x-3}{x^2+5x-6}$

$$(x+6)(x-1) = 0$$

$$x \neq -6, 1$$

2. Simplify each rational expression, if possible. You do not need to list the excluded values.

a. $\frac{4x}{4x+8} = \frac{4}{4(x+2)}$

$$= \frac{1}{x+2}$$

b. $\frac{2x^2}{x-4}$

$$= \frac{2x^2}{x-4}$$

c. $\frac{15x^3}{25x}$

$$= \frac{3x^2}{5}$$

d. $\frac{b+2}{b^2+4b+4} = \frac{b+2}{(b+2)(b+2)}$

$$= \frac{1}{b+2}$$

e. $\frac{x^2-81}{x^2+7x-18} = \frac{(x-9)(x+9)}{(x-9)(x+2)}$

$$= \frac{x+9}{x+2}$$

f. $\frac{x-1}{x^2-4x-5} = \frac{x-1}{(x-5)(x+1)}$

$$= \frac{x-1}{x^2-4x-5}$$

g. $\frac{3x-15}{6x-30} = \frac{3(x-5)}{6(x-5)}$

$$= \frac{1}{2}$$

h. $\frac{12-4x}{x^2+2x-15} = \frac{-4(x-3)}{(x+5)(x-3)}$

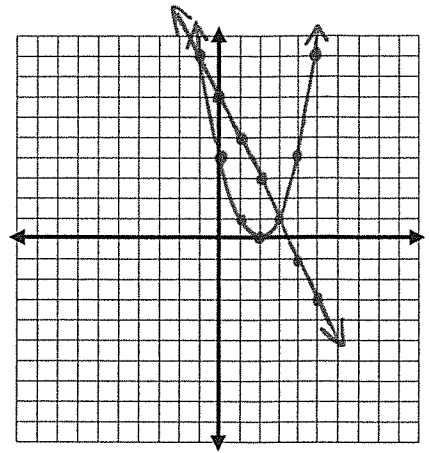
$$= \frac{-4}{x+5}$$

i. $\frac{1-x^2}{2x^2+4x+2} = \frac{(1-x)(1+x)}{2(x+1)(x+1)}$

$$= \frac{1-x}{2(x+1)}$$

3. Solve the system of equations by graphing.

$$\begin{cases} y = -2x + 7 \\ y = x^2 - 4x + 4 = (x-2)^2 \end{cases}$$



Two solutions: $(3, 1)$ and $(-1, 9)$

4. Solve the system of equations by substitution.

$$\begin{cases} y = -3x + 1 \\ y = 2x^2 + 4x - 3 \end{cases}$$

$$2x^2 + 4x - 3 = -3x + 1$$

$$2x^2 + 7x - 4 = 0$$

$$(2x-1)(x+4) = 0$$

$$x = \frac{1}{2}, -4$$

$$y = -3\left(\frac{1}{2}\right) + 1$$

$$y = -\frac{1}{2}$$

$$y = -3(-4) + 1$$

$$y = 13$$

Two solutions:

$$\left(\frac{1}{2}, -\frac{1}{2}\right) \text{ and } (-4, 13)$$

5. Solve the system of equations by substitution.

$$\begin{cases} y = x^2 - x - 6 \\ y = 2x^2 + 2x - 6 \end{cases}$$

$$2x^2 + 2x - 6 = x^2 - x - 6$$

$$x^2 + 3x = 0$$

$$x(x+3) = 0 \quad x = 0, -3$$

$$y = 0^2 - 0 - 6 = -6$$

$$y = (-3)^2 - (-3) - 6 = 6$$

Two solutions:

$$(0, -6) \text{ and } (-3, 6)$$

6. Multiply or divide. Simplify as much as possible.

a. $\frac{24x^2y}{510xy}$

$$= \frac{2xy}{5}$$

b. $\frac{x^2 - 2x + 1}{x^2 - 1} \div (4x - 4)$

$$= \frac{(x-1)(x-1)}{(x-1)(x+1)} \cdot \frac{1}{4(x-1)}$$

$$= \frac{1}{4(x+1)}$$

c. $\frac{x^2 + 9x + 8}{x^2 - 1} \div \frac{x^2 + 10x + 16}{3x^2 - 3x}$

$$= \frac{(x+8)(x+1)}{(x-1)(x+1)} \cdot \frac{3x(x-1)}{(x+8)(x+2)}$$

$$= \frac{3x}{x+2}$$

7. Add/subtract and simplify.

$$a. \frac{3x}{8x^3} + \frac{7x}{8x^3} = \frac{10x}{8x^3}$$

$$= \frac{5}{4x^2}$$

$$b. \frac{x^2-3x}{x+4} + \frac{4x-12}{x+4}$$

$$= \frac{x^2+x-12}{x+4} = \frac{(x+4)(x-3)}{x+4}$$

$$= x-3$$

$$c. \frac{y^2+7y}{y^2+3y} - \frac{2y-6}{y^2+3y} = \frac{y^2+5y+6}{y^2+3y}$$

$$= \frac{(y+3)(y+2)}{y(y+3)} = \frac{y+2}{y}$$

$$d. \frac{1}{8x^3} + \frac{3}{2x} \cdot \frac{4x^2}{4x^2}$$

$$= \frac{1}{8x^3} + \frac{12x^2}{8x^3}$$

$$= \frac{12x^2+1}{8x^3}$$

$$e. \frac{2x}{x+4} - \frac{6}{x^2-16} = \frac{2x(x-4)}{(x+4)(x-4)} - \frac{6}{(x+4)(x-4)}$$

$$= \frac{2x^2-8x-6}{(x+4)(x-4)} = \frac{2(x^2-4x-3)}{(x+4)(x-4)}$$

$$= \frac{2(x^2-4x-3)}{(x+4)(x-4)}$$

$$f. \frac{3}{x-4} + \frac{2}{4-x} = \frac{3}{x-4} + \frac{-2}{x-4}$$

$$= \frac{1}{x-4}$$

8. Review!

The following data was collected from people who had heart attacks and who were given CPR soon after their attack. For each given delay time, the survival rate was calculated.

a. Find the equation of the line through the data.

$$m = \frac{64-52}{9-13} = \frac{12}{-4} = -3$$

$$y-64 = -3(x-9) \quad \text{or} \quad y = -3x + 91$$

CPR time after attack (in minutes)	Survival rate (percent)
9	64
13	52
17	40

b. Interpret the meaning of the slope for this problem.

Every minute that goes by after a heart attack before CPR, chance of survival goes down 3%.

c. Interpret the meaning of the y-intercept for this problem.

You have a 91% chance of survival if you get CPR immediately after a heart attack.

d. Find the x-intercept. Interpret the meaning of the x-intercept for this problem.

$$0 = -3x + 91$$

$$-3x = -91$$

$$x = 30.3 \text{ minutes}$$

After a half hour you have no chance of survival.

Survival rate (percent)
64
52
40