

Name: _____

Date: _____

Math 12 Honors: HW Section 1.5 Solving Rational Functions

1. Indicate which of the following are rational functions. If not, explain why:

a) $y = \frac{x+2}{x-3}$	b) $y = x^3 - x^2$	c) $y = \frac{2^{x-3}}{x}$	d) $y = \frac{\sqrt{x}}{x}$
e) $y = x^{-3} + \sqrt{2}x^{-2}$	f) $y = \frac{12}{x}$	g) $y = x^3 + x^2 + x $	h) $x^2 + y^2 + xy$

2. Solve each of the following equations. Indicate any extraneous roots if any:

a) $\frac{4}{x} + \frac{3}{x+2} = 5$	b) $\frac{-2}{x+3} - \frac{5}{x} = 2$
c) $\frac{x^2+6}{3} - \frac{7}{2} = \frac{x+15}{2}$	d) $\frac{5}{3x-1} - \frac{9}{6x-1} = 2$
e) $\frac{3x}{x-2} + \frac{x}{x+2} = \frac{2x+3}{x+2}$	f) $\frac{2x+3}{x+2} - \frac{x+2}{x-1} = \frac{3x}{x-1}$
g) $\frac{3x^2}{x^2-4} - \frac{3x^2}{x^2+5x+6} = \frac{4}{x+3}$	h) $\frac{3x+1}{x^2-2+x} = \frac{2x-3}{x^2-x-6} - \frac{5}{x^2-4x+3}$

3. Solve each of the following equations. Indicate any extraneous roots if any:

a) $\frac{3}{x+2} - \frac{2}{x-1} = 5$	b) $\frac{2}{x+2} + \frac{1}{x} = 1$
c) $\frac{2}{y} = \frac{3}{y^2 + 2}$	d) $\frac{x-2}{x-3} + \frac{x-3}{x-2} = \frac{2x^2}{x^2 - 5x + 6}$
e) $x + \frac{30}{x+8} = 3$	f) $\frac{5}{x+1} + \frac{4}{3} = \frac{x+1}{x-1}$
g) $\frac{2x-1}{2x+1} + \frac{x+1}{x+3} = \frac{3x-1}{2x+1} + \frac{1}{6}$	h) $\frac{2x-3}{x-1} - \frac{x-1}{x+2} = \frac{2x-5}{x+2} + \frac{2-x}{1-x}$

4. For which value of "x" will $\frac{3+x}{4+x}$ and $\frac{6+x}{8+x}$ be equal?

5. The rational expression $\frac{2x^2+1}{x^2-3}$ may be written as $2 + \frac{A}{x^2-3}$, where "A" is an integer. What is the value of "A"?

6. Solve for "k" $\frac{3}{x-1} + \frac{k}{x} + \frac{7}{x+1} = \frac{5x^2-4x+5}{x^3-x}$

7. Solve for "x": $1 + \frac{1}{1 + \frac{1}{x} + \frac{1}{2x}} = \frac{7}{5}$

8. For what value(s) of "x" is the equation true? $\frac{8}{9} = \frac{x}{x + \frac{x}{x+x}}$

9. Express "k" as a common fraction in terms of "n" $\frac{k(n-2)!}{(n+1)!} = \frac{(n-1)!}{(n+2)!}$

10. What is the greatest integer “n” for which $\frac{24n}{n-4}$ is an integer? MC Coop2012

11. Solve the following function for “k”: $\frac{1}{1 - \frac{1}{1 - \frac{1}{1 - \frac{1}{x}}}} = x^k$

12. For all values other than $x = -1$ and $x = 2$, what is the value of $\frac{2x^2 - x}{x^2 - x - 2} - \frac{4 + x}{(x+1)(x-2)}$? AHSME1954

13. Evaluate: $\sum_{x=1}^{2003} \frac{1}{x^2 + 7x + 12}$

14. If “a” and “b” are positive integers such that $\frac{1}{a} + \frac{1}{2a} + \frac{1}{3a} = \frac{1}{b^2 - 2b}$, then which of the following is the smallest possible value of $a + b$?

- a) 8 b) 6 c) 96 d) 10 e) 50

15. Challenge: Given that “n” is an integer, for how many values of “n” is $\frac{2n^2 - 10n - 4}{n^2 - 4n + 3}$ an integer? Fermat 2004#25

Let “a”, “b”, and “c” be given nonzero real numbers. Find “x”, “y” and “z” if the following equation is true:

$$\frac{ay + bx}{xy} = \frac{bz + cy}{yz} = \frac{cx + az}{zx} = \frac{4a^2 + 4b^2 + 4c^2}{x^2 + y^2 + z^2}$$

(COMC 2015)