Solving Rational Equations (9.3)

p466 day 4

hw: p452#4d, 6, 7b, 8c

8. Write the equation of a possible rational function with each set of characteristics.

a) vertical asymptotes at $x = \pm 5$ and x-intercepts of -10 and 4

4. For each function, predict the locations of any vertical asymptotes, points of discontinuity, and intercepts. Then, graph the function to verify your predictions.

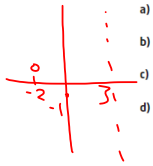
a) $y = \frac{x^2 + 4x}{x^2 + 9x + 20}$

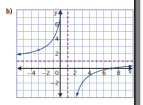
b) $y = \frac{2x^2 - 5x - 3}{x^2 - 1}$

c) $y = \frac{x^2 + 2x - 8}{x^2 - 2x - 8}$

d) $y = \frac{2x^2 + 7x - 15}{9 - 4x^2}$

8.c) $y = \frac{(x+2)(x+1)}{(x+2)(x-3)}$





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ex1: Alex has made 12 out of 19 free throws so far. He wants to be able to shoot 80% from the line. How many will he have to hit in a row before he reaches 80%?

$f = \frac{12}{19}$ $f(x) = \frac{12+x}{19+x}$ $\frac{13}{20}$ $\frac{14}{21}$ $\frac{15}{22}$ ....

$(19+x)\ 0.8 = \frac{12+x}{19+x}$ $(19+x)$

$0.8(19+x) = (12+x)$

$15.2 + 0.8x = 12+x$

$3.2 = 0.2x$

$16 = x$

16 in a row

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ex2: Solve $x + \frac{6}{x+2} = 5$ $(x+2)$ $x \neq -2$

$x(x+2) + 6 = 5(x+2)$

$x^2 + 2x + 6 = 5x + 10$

$x^2 - 3x - 4 = 0$

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

$x = 4$ $x = -1$

Solving Rational Equations (9.3)

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ex3: Solve $\frac{x}{2x+5} + 2x = \frac{8x+15}{4x+10}$ $x \neq -\frac{5}{2}$

$2(2x+5)$ $\frac{x}{2x+5} + 2x = \frac{8x+15}{2(2x+5)}$ $2(2x+5)$

$2x + 2x(2)(2x+5) = 8x+15$

$2x + 8x^2 + 20x = 8x + 15$

$8x^2 + 14x - 15 = 0$ $b = 120$ $a = 14$

$8x^2 + 20x - 6x - 15 = 0$

$4x(2x+5) - 3(2x+5) = 0$

$(4x-3)(2x+5) = 0$

$x = \frac{3}{4}$ $x = -\frac{5}{2}$ restriction

Solving Rational Equations (9.3)

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ex4: Solve to one decimal place $\frac{x^2 - 3x - 7}{3 - 2x} = x - 1$ $x \neq 1.5$

$x^2 - 3x - 7 = (3-2x)(x-1)$

$x^2 - 3x - 7 = 3x - 3 - 2x^2 + 2x$

$3x^2 - 8x - 4 = 0$

$x = \frac{8 \pm \sqrt{64 - 4(3)(-4)}}{2(3)}$

$= \frac{8 \pm \sqrt{112}}{6}$

$x = 3.1$ $x = -0.4$

Solving Rational Equations (9.3)

p466 day 4

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

hw: p466#3ac, 5ac, 11

3. Solve each equation algebraically.

a) $\frac{5x}{3x+4} = 7$ $x = -\frac{4}{3}$

$5x = 7(3x+4)$

$5x = 21x + 28$

$-28 = 16x$

$-1.75 = x$

c) $\frac{x^2}{x-2} = x - 6$ $x \neq 2$

$x^2 = (x-6)(x-2)$

$x^2 = x^2 - 8x + 12$

$8x = 12$

$x = 1.5$

5. Determine the approximate solution to each rational equation graphically, to the nearest hundredth. Then, solve the equation algebraically.

a) $\frac{x+1}{2x} = x - 3$ $x \neq 0$

$x + 1 = 2x(x-3)$

$x + 1 = 2x^2 - 6x$

$0 = 2x^2 - 7x - 1$

$x = \frac{7 \pm \sqrt{49 - 4(2)(-1)}}{2(2)}$

$x = 3.64$ $x = -0.14$

c) $\frac{2}{x} = 3 - \frac{7x}{x-2}$ $x(x-2)$ $x \neq 0, 2$

$2(x-2) = 3x(x-2) - 7x(x)$

$2x - 4 = 3x^2 - 6x - 7x^2$

$4x^2 + 8x - 4 = 0$

$x^2 + 2x - 1 = 0$

$x = \frac{-2 \pm \sqrt{4 - 4(1)(-1)}}{2(1)}$

$= -1 \pm \sqrt{2}$

$x = 0.41$ $x = -2.41$

11. $2 = \frac{50t}{1.2t^2 + 5}$

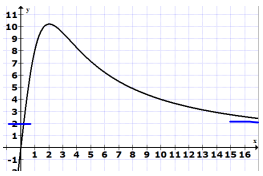
$2.4t^2 + 10 = 50t$

$1.2t^2 - 25t + 5 = 0$

$t = \frac{25 \pm \sqrt{(25)^2 - 4(1.2)(5)}}{2(1.2)}$

$= \frac{25 \pm \sqrt{625 - 24}}{2.4}$

$t = \frac{25 \pm 24.5}{2.4}$ $t = 20.6s$ $t = 0.2s$



11. A researcher is studying the effects of caffeine on the body. As part of her research, she monitors the levels of caffeine in a person's bloodstream over time after drinking coffee. The function $C(t) = \frac{50t}{1.2t^2 + 5}$ models the level of caffeine in one particular person's bloodstream, where t is the time, in hours, since drinking the coffee and $C(t)$ is the person's bloodstream concentration of caffeine, in milligrams per litre. How long after drinking coffee has the person's level dropped to 2 mg/L?