Learning Goal Check!

Sketch the following rational functions. State all asymptotes and show all work to determine end behaviour around asymptotes.

$$f(x)=\frac{4x+1}{2x+2}$$

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

Questions from Homework?

9 $I(t) = \frac{15t+25}{t}$

d) If $t=0$, there is NO investment
$\therefore$ makes sense!

e) $t=0.01$ $I(0.01) = \frac{15(0.01)+25}{0.01}$
$= 2515$

$t=0.0001$ $I(0.0001) = \frac{15(0.0001)+25}{0.0001}$
$= 250015$

$\therefore$ NO large gain with very small amount
as $t \to 0$, $I \to \infty$

10) $c(t) = \frac{2t}{2+t}$

$c(0) = \frac{2(0)}{2+0}$
$= 0$

$c(12) = \frac{2(12)}{2+12}$
$\doteq 1.71$

$c(24) = \frac{2(24)}{2+24}$
$\doteq 1.85$

$\therefore$ Increasing
$t \to \infty$, $c \to \infty$

Lesson 5.04 - Solving Rational Equations

Learning Goals:

- I can state the restrictions on rational equations
- I can solve rational equations, including in "real world" situations

$$\frac{x}{2}-\frac{x}{3}=\frac{1}{4}+\frac{1}{5}$$

L.C.M of 2 and 3 = 6

L.C.M of 4 and

$$\frac{3x-2x}{6}=\frac{5+4}{20}$$

Solve each of the following. Don't forget to state any restrictions.

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

Restriction $x \neq -3$

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

$x+2 = 2x+6$

$-x = 4$

$x = -4$

$$\frac{x+3}{x^2-4x-21}=1$$

$$\frac{x+3}{(x-7)(x+3)}=1$$

$$\frac{1}{(x-7)}=1$$

$1 = x-7$

$8 = x$

Restrictions $x \neq 7$ or -3

Solve each of the following, don't forget to state any restrictions.

$$\frac{1}{x}+\frac{x}{3}=\frac{5}{x}$$

Restriction $x \neq 0$

$\frac{1}{x}+\frac{x}{3}-\frac{5}{x}=0$

$-\frac{4}{x}+\frac{x}{3}=0$

$-\frac{12}{3x}+\frac{x^2}{3x}=0$

$\frac{x^2-12}{3x}=0$

$\Rightarrow x^2-12=0$

$(x-\sqrt{12})(x+\sqrt{12})=0$

$x=2\sqrt{3}$

or

$x=-2\sqrt{3}$

$x \neq 0$

$$\frac{2}{x+2}+\frac{1}{x+3}=\frac{1}{x+2}$$

Restriction

$x \neq -2$

$x \neq -3$

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

$\frac{1}{x+2}+\frac{1}{x+3}=0$

$\frac{x+3}{(x+2)(x+3)}+\frac{x+2}{(x+2)(x+3)}=0$

$\frac{2x+5}{(x+2)(x+3)}=0$

$2x+5=0$

$2x=-5$

$x=-\frac{5}{2}$

$x \neq -3, x \neq -2$

Word Problems....

Ned and Ted are both carpenters. Ted can build a table in x hours, while it takes Ned 10 hours more ($x+10$). If it takes them 12 hours working together, how long would it take each of them individually to complete the table? (HINT: You need a rational equation...)

$x + (x+10) = 12$

$2x + 10 = 12$

$2x = 2$

$x = 1$

$\frac{1}{x} + \frac{1}{x+10} = \frac{1}{12}$ ← tables / hour

$\frac{12(x+10)}{12x(x+10)} + \frac{12x}{12x(x+10)} - \frac{(x)(x+10)}{12(x)(x+10)} = 0$

$\frac{12x+120+12x-x^2-10x}{12x(x+10)} = 0$

$\frac{-x^2+14x+120}{12x(x+10)} = 0$

Restrictions

$x \neq 0$

$x \neq -10$

$-x^2+14x+120 = 0$

$x^2-14x-120 = 0$

$(x-20)(x+6) = 0$

$x = 20$ or -6

-6 ← NO!

∴ Ted takes 20h

Ned takes 30h

Homework:

pg 285 #3b, 4b (do not verify), 5c, 6abc, $9^{2,}$ 11, 12^{2}
Challenge: 16 (use desmos: answer should be 0.417s and 1.705s)

2- final answers must be expressed in simplified exact form