4. Working together, it usually takes Dan and Matthew three days to complete a task. Working alone, Dan takes two days longer than Matthew to complete the same task.together with Matthew. How many days on average does it take for Matthew to complete the task by himself?

$$D+M \ : \ \text{rate} = \frac{1}{3} \qquad \qquad \frac{1}{3} = \frac{1}{x+2} + \frac{1}{x}$$

$$D \ : \ \text{rate} = \frac{1}{x+2} \qquad \frac{(x)(x+2)(1)}{3(x)(x+2)} = \frac{(3)(x)(1)}{3(x)(x+2)} + \frac{(3)(x+2)}{3(x+2)(x)}$$

$$M \ : \ \text{rate} = \frac{1}{x} \qquad \qquad x^2 + 2x = 3x + 3x + 6$$

$$x^2 - 4x - 6 = 0$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-6)}}{2(1)} = \frac{4 \pm \sqrt{40}}{2} = 5.16$$

Matt takes 5.16 days

5. Matthew currently has 25 of the 120 quotes over the year. He has set a goal of obtaining 80% of the quotes for the rest of the year. How many quotes would have to be made so that he could end the year off with 50% of the year's quotes?

Matt has $\frac{25}{120}$

$$\frac{25 + 0.8n}{120 + n} = \frac{1}{2}$$

$n =$ # of additional quotes

$$2(25 + 0.8n) = (120 + n)(1)$$

$$50 + 1.6n = 120 + n$$

$$0.6n = 70$$

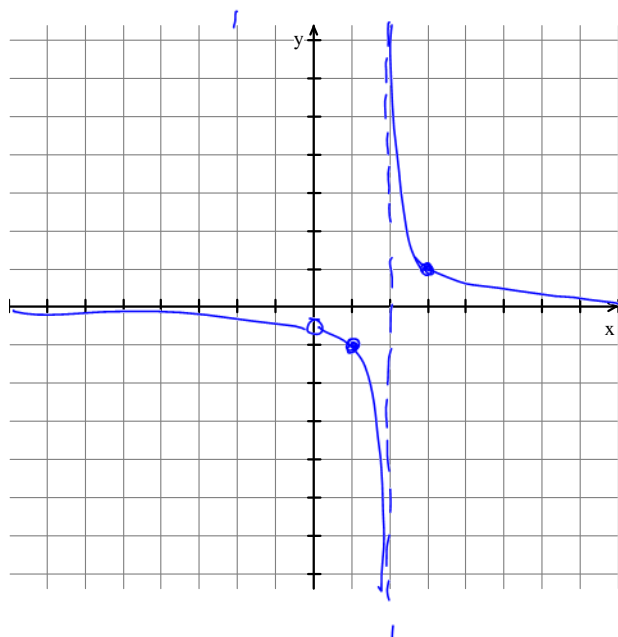$$n = 116.\overline{6}$$

There need to be 117 quotes

9.4 Review Warmup

1. Without using your calculator, sketch a graph of the

   function $y = \dfrac{x}{x^2 - 2x}$ $= \dfrac{x}{x(x-2)}$

   $= \dfrac{1}{x-2}$ with a P.o.d at $x = 0$

   p.od at $y = \dfrac{1}{(0)-2}$

   $= -\dfrac{1}{2}$

   or $\left(0, -\dfrac{1}{2}\right)$

2. Consider the graphs of $f(x) = \dfrac{x^2 - x - 6}{x^2 - 9}$ and $g(x) = \dfrac{x}{x^2 - 9}$. Without using your calculator, discuss any similarities and differences between the graphs of these two functions.

   $\dfrac{(x-3)(x+2)}{(x-3)(x+3)}$ vs $\dfrac{x}{(x+3)(x-3)}$

   $f(x)$ has a P.o.D.

   both have v. asymptote at $x = -3$

   they have different horizontal asymptotes (end behaviour)

3. Determine the range of the rational function sketched below:
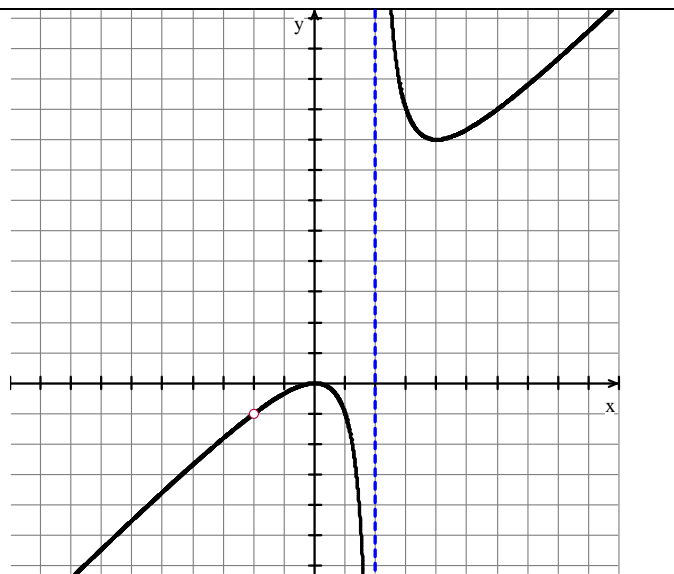
   A. All reals
   B. $(-\infty, 0]$, $[8, \infty)$
   C. $(-\infty, 2)$, $(2, \infty)$ ← circled
   D. $(-\infty, -1)$, $(-1, 0)$, $[8, \infty)$

4. Without using your calculator, match the graphs with the functions

a) $y = \dfrac{1}{x-2}$	b) $y = 2 - \dfrac{1}{(x+1)^2}$	c) $y = \dfrac{x+2}{x-2}$
d) $y = \dfrac{x^2}{2x-4}$	e) $y = \dfrac{x^2-4}{x-2}$	f) $y = \dfrac{1}{x^2-4}$
g) $y = \dfrac{x^2}{x^2-4}$	h) $y = \dfrac{x}{x^2-4}$	i) $y = \dfrac{x+2}{x^2-4}$

C

G

B

I

D

E

H

A

F