Lesson: Write possible rational function

$$y = \frac{p(x)}{q(x)}$$

Ex ① Asymptotes at $x = 2$ and $y = -3$
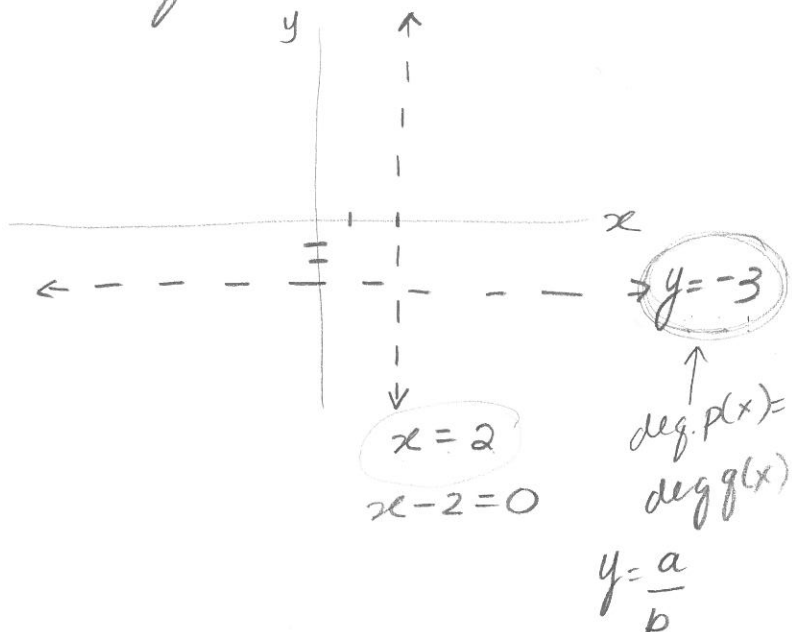
a) write a possible rational function.

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

OR

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

$$y = \frac{-12x}{4x - 8}$$

$x = 2$

$x - 2 = 0$

$\deg. p(x) = \deg q(x)$

$y = \frac{a}{b}$

EX ②   VA at $x = \pm 2$ and   HA at $\boxed{y = 0}$

$$\text{deg } p(x) < \text{deg } g(x)$$

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

$$y = \frac{6}{(x^2 - 4)}$$

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

Ex ③   Hole at $\boxed{\begin{matrix} x & y \\ -4, & -2 \end{matrix}}$ and x-int at -1

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

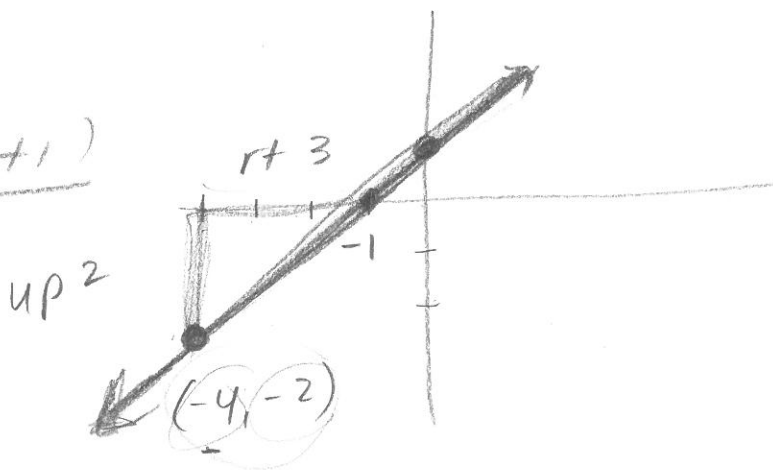$$0 = x + 1$$
$$-1 = x$$

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

$$y = \frac{2}{3} \cdot \frac{(x+4)(x+1)}{(x+4)}$$

r + 3

up 2

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

$$-2 = \frac{2}{3}(-4+1)$$

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

(-4, -2)

Grade 12 Pre-Calculus
Determining Equations of Rational Functions

1. Determine a possible equation for the rational functions described below.

   a) Vertical asymptotes at $x = 3$ and $x = \frac{6}{7}$, x −intercepts of $-\frac{1}{4}$ and 0.

   b) Vertical asymptotes at $x = 5$ and $x = -5$ and x intercepts of -10 and 4.

   c) Vertical asymptote at $x = -4$, a point of discontinuity at $\left(-\frac{11}{2}, 9\right)$ and an x − intercept of 8.

   d) A point of discontinuity at $\left(-2, \frac{1}{5}\right)$, a vertical asymptote at $x = 3$, and an x − intercept of -1.

2. Identify any asymptotes, points of discontinuity ('holes'), and intercepts for each of the following.

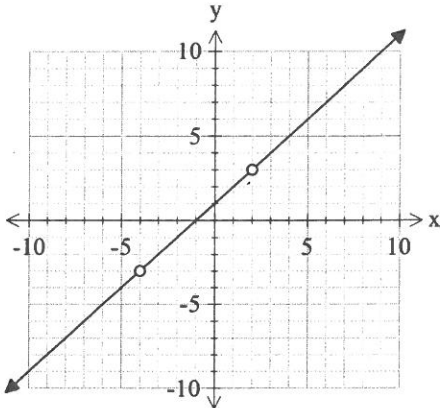   a) $y = \frac{x}{x+2}$

   b) $y = \frac{x^2+2x}{x}$

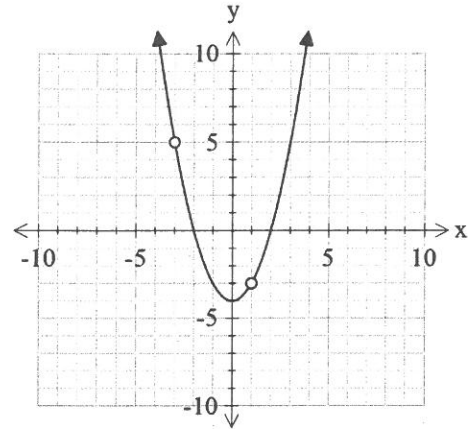   c) $y = \frac{x^2-16}{x-4}$

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

3. Identify the x-intercepts and the equations of any vertical or horizontal asymptotes for the rational function $y = \dfrac{(x-a)(x-d)}{(x-b)(x+c)}$.

4. Write the equation of the rational function shown in each graph. Leave your answers in factored form.

   a)

   b)

5. Peter is a humanitarian aid worker. He uses the function $C(p) = \dfrac{500p}{100-p}$ to estimate the cost, C, in thousands of dollars, of vaccinating p percent of the population of the country in which he is working.

   a) How does the graph act near its non-permissible value? Give a reason for your answer.

   b) Graph the function for an appropriate domain. Explain what the graph shows about the situation.

   c) Do you think this is a good model for the estimated cost of vaccinating the population? Explain.