Reading Questions 9.5 due Monday June 23 Name__________________________ Row ______
(30 pts)

(1) 1. The short run behavior of a *polynomial* (from Section **9.3**) is found by examining its factored form. How is the short run behavior of a *rational function* (from Section **9.5**) found?
o examining the ratio of its leading terms
o examining its factored form as well
o observing the behavior as $x \to \infty$ or $x \to -\infty$

(1) 2. Since a fraction $\frac{p}{q}$ can be written as $\frac{p}{q} = p \cdot \frac{1}{q}$, we can confidently find when the fraction $\frac{p}{q}$ is 0. How?
Tip: Read the last sentence on page 415. It is so important, it should be written on your heart. Since that could get messy, simply rewrite it here instead, word for word. It is a key concept to this section and the answer to this question.

(1) 3. Explain why a fraction such as $\frac{1}{x}$ is large whenever its denominator is small. Use examples.

(1) 4. Because a fraction is large whenever its denominator is small, we can find the vertical asymptote of a rational function by
o setting its numerator equal to 0.
o setting its denominator equal to 0.
o setting the value of x equal to 0 and solving for y.
o observing the behavior as $x \to \infty$ or $x \to -\infty$

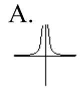
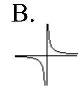
5. a. Because of your answer to previous question, $r(x) = \frac{25}{(x+2)(x-3)^2}$ has two vertical asymptotes,
(3) namely $x =$ _____ and $x =$ _____, and no zeros since ____.
By the way, you answered a similar question on a previous assignment when you examined Example **4** of Section **2.2**.

(1) b. Near the value $x = -2$ the graph of $r(x)$ looks like the function $y = \frac{1}{\square}$, which is a ____________ shift
{vertical, horizontal}
(2) of the power function $y = \frac{1}{x}$ ______________ by ________ units.
{up, down, left, right} how many?

(2) c. Near the value $x = 3$ the graph of $r(x)$ looks like the function $y = \frac{\square}{\square}$, which is a ____________ shift
{vertical, horizontal}
(2) of the power function $y = \frac{5}{x^2}$ ______________ by ________ units.
{up, down, left, right} how many?

(1) d. Which one of these graphs looks like $y = \frac{1}{x}$? ______________
Choose A, B, C, or D

(1) Which one of these graphs looks like $y = \frac{5}{x^2}$? ______________
Choose A, B, C, or D

A.

B.

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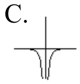
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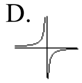


Notice the how these two shapes appear in the graph on page 417 near their vertical asymptotes.

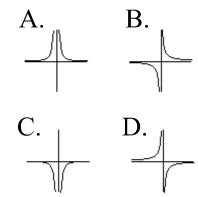
OVER PLEASE

(1) e. The **short-run** behavior of $r(x)=\dfrac{25}{(x+2)(x-3)^2}$ includes its vertical asymptotes and its intercepts.
How did the text find the y-intercept of $r(x)$?

f. The **long-run** behavior of $r(x)$ is simply what happens to the function as $x\to\infty$ or $x\to-\infty$, and from the ideas in Section **9.4**, we can see that for large x, the function $r(x)=\dfrac{25}{(x+2)(x-3)^2}$ has

(1) the same long-run behavior as the power function with the equation $y=$ ☐.

(1) This power function looks like which graph? ____________
Choose A, B, C, or D

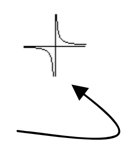


Notice the how this shape appears in the graph on page 417.
(1) Therefore, the function $r(x)$ has a horizontal asymptote of $y=$ ☐.

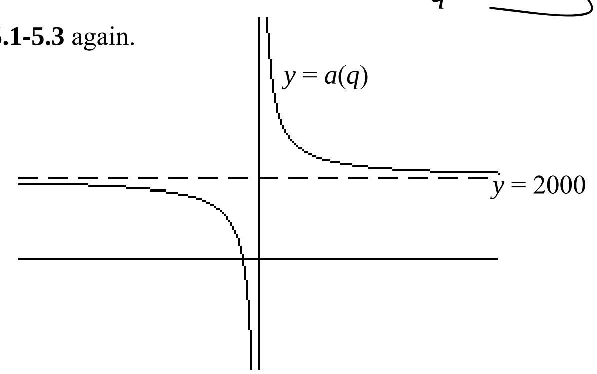
(1) 7. A graph can never cross its vertical asymptote.
o True
o False

(1) 8. A graph can never cross its horizontal asymptote.
o True
o False

9. The average cost function $y = a(q)$ on page 409 is a transformation of the power function $y=\dfrac{1}{q}$.



Complete the blanks and boxes. Tip: You might look at Sections **5.1-5.3** again.



(1) The function $y = a(q)$ is a vertical ____________ of
{stretch, compression }

(1) the graph of $y=\dfrac{1}{q}$ by ____________ units
how many?

(2) and a ____________ shift ____________
{vertical, horizontal } {up, down, left, right}

(3) by ________ units since $a(q)=\dfrac{2{,}500{,}000 + 2000q}{q}$ $=$ ☐ $\cdot\dfrac{1}{q}+$ ☐.
how many?

(1) 10. Read Section **9.5** Example 3 thoroughly. For what reason does the text give for making the power of the factor of $(x + 2)$ in the denominator 2? Hint: notice your answer to Question 5c and 5d of this assignment.