

6.5 Polynomial and Rational Functions Review

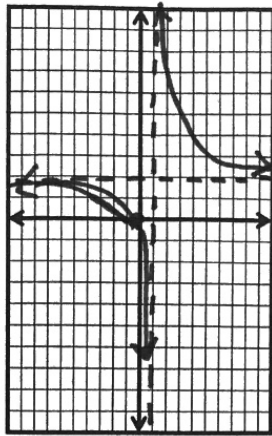
$(x-5)(x+3)$

- I. Given the following functions, answer the questions below. If none, write none.  
 $R(x) = \frac{x+1}{x(x-3)}$      $P(x) = \frac{x+1}{(x-1)^2}$      $S(x) = \frac{x^2-2x-15}{2(x-3)(x-1)}$      $Q(x) = \frac{x-7}{x^2-49}$

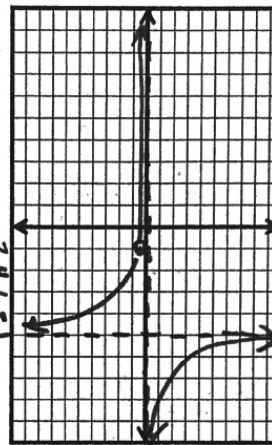
- a. Which graph(s) has/have two vertical asymptotes? R, P  
 b. Which graph(s) has/have a hole? S, Q  
 c. Which graph(s) has/have only one x-intercept? R, P, S  
 d. Which graph(s) has/have a horizontal asymptote at  $y=0$ ? R, P, Q  
 e. Which graph has two numbers excluded from the domain? R, S, Q

II. Graph the following. Show all your work below. Make the graph neat. Clearly mark all points.

$R(x) = \frac{x}{x+2}$   
 VA  $x = -2$   
 HA  $y = 1$   
 X-Int  $(0, 0)$



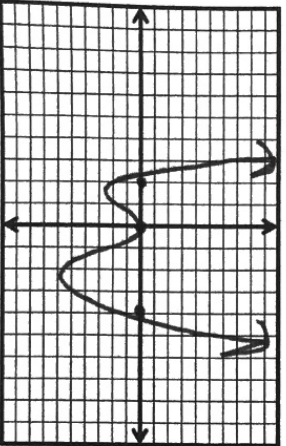
$P(x) = \frac{x-2}{x^2-12x+20}$   
 VA  $x = 10$   
 HA  $y = 0$   
 X-Int  $(2, 0)$   
 Hole  $(2, -8)$



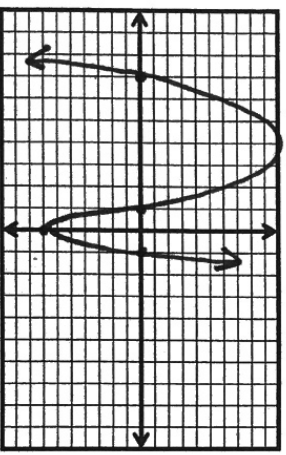
III. Graph each polynomial below:

- a) Use the Leading Coefficient Test to determine the polynomial function's end behavior.  
 b) Find the x-intercepts by setting the function = 0 and factoring.  
 c) Determine each soln's multiplicity and state if it turns around or crosses the x-axis.  
 d) Determine the y-intercept of each polynomial function.

$f(x) = x^4 - 2x^3 - 8x^2$



$f(x) = x^3 + 7x^2 - x - 7$



- A.  $x \rightarrow \infty, f(x) \rightarrow \infty$     C.  $(0, 0)$   
 $x \rightarrow -\infty, f(x) \rightarrow \infty$   
 B.  $0 = x^2(x^2 - 2x - 8)$   
 $0 = x^2(x-4)(x+2)$   
 $x = 0, 4, -2$   
 C.  $m \downarrow$   $m \uparrow$  - through
- A.  $x \rightarrow \infty, f(x) \rightarrow \infty$     D.  $(0, -7)$   
 $x \rightarrow -\infty, f(x) \rightarrow -\infty$   
 B.  $x^2(x+7) - 1(x+7) = 0$   
 $(x^2-1)(x+7) = 0$   
 $(x+1)(x-1)(x+7) = 0$   
 $x = 1, -1, -7$   
 All mult. 1  $\rightarrow$  pass through

4. Describe the vertical asymptote(s) and hole(s) for the graph of  $y = \frac{(x-5)(x-2)}{(x-2)(x+4)}$   
 VA  $x = -4$     Hole  $(2, -\frac{1}{2})$      $g(x) = \frac{x-5}{x+4}$      $g(2) = \frac{2-5}{2+4} = -\frac{3}{6} = -\frac{1}{2}$

5. Determine the horizontal asymptote of the graph of  $y = \frac{6x^2 + 5x + 9}{7x^2 - x + 9}$   
 $y = 6/7$

6. Write a polynomial function in standard form with zeros at -2 (multiplicity of 2), 3 (multiplicity of 1), and 4 (multiplicity of 1) and also with a degree of 4.  
 $y = (x+2)^2(x-3)(x-4)$      $y = x^4 + 5x^3 - 4x^2 - 44x - 48$

7. Write a polynomial function in standard form with zeros at 6, -3, and 1 and also with a degree of 3.  
 $y = (x-6)(x+3)(x-1)$   
 $y = x^3 - 4x^2 - 15x + 18$

Objective: Review Right Triangle Tris

8. From a sailboat, the angle of elevation to the top of a lighthouse 311 ft away is  $17^\circ$ . Find the height of the lighthouse.  
 $\tan 17 = \frac{x}{311}$      $x = 311 \tan 17$

9. A surveyor is standing 15 feet from the base of the Washington Monument. The surveyor measures the angle of elevation to the top of the monument as  $78.3^\circ$ . How tall is the Washington Monument?  
 $\tan 78.3 = \frac{x}{15}$      $x = 15 \tan 78.3 = 72.432$  ft

- State the quadrant in which  $\theta$  lies.
10.  $\sin \theta < 0$  and  $\cos \theta < 0$     III  
 11.  $\sin \theta > 0$  and  $\tan \theta < 0$     II  
 12.  $\sin \theta > 0$  and  $\cos \theta > 0$     I  
 13.  $\tan \theta < 0$  and  $\sec \theta > 0$     IV

