

MATH-7A TEST 2 (Unit 3 – Polynomial and Rational Functions and Graphs)

100 points*

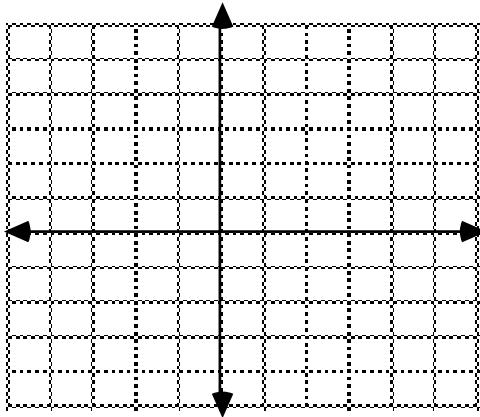
NAME: _____

Note: this is a little longer than your test will be.

Fill in the blanks. (2 points each)

- (1) What is the equation of the horizontal asymptote of $f(x) = \frac{3x^2+1}{2x^3-5x}$? _____
- (2) True or False: If c is a rational zero of $P(x) = 2x^3 - 4x^2 + x - 5$ then it is in the list $\pm \left\{1, 2, \frac{1}{5}, \frac{2}{5}\right\}$ _____
- (3) Is $f(x) = \frac{(x-2)^{3/2}}{x^4\sqrt{x+7}}$ a rational function? _____
- (4) The graph of $f(x) = \frac{x^2-4}{x-2}$ has a hole at the point _____
- (5) Given $y = \frac{5x}{(x-1)(x+3)}$, as $x \rightarrow 1^-$, $y \rightarrow$ _____.
- (6) What is the equation of the slant asymptote of $f(x) = \frac{3x^2-4x-5}{x-1}$? _____

- (7) Given the function $f(x) = -2x^2 - 6x + 1$ (6 points)
 put $f(x)$ in the form $f(x) = a(x-h)^2 + k$ and sketch the graph. On the graph label the vertex plus one other point. Show scale.



- (8) Solve the following. Show appropriate method. Answer in interval notation. (10 points each)
- (a) $(x-3)^2(x+2) > 0$
- (b) $\frac{1}{x+1} \leq \frac{4}{x-3}$

(9) Given the polynomial $P(x) = 2x^4 - 5x^3 + 5x^2 - 20x - 12$ (12 points)

(a) Before finding the zeros of $f(x)$, list all POSSIBLE rational roots _____

(b) Find the zeros. Show all steps clearly including trying numbers that did not work.

(c) Factor P completely.

(10) Suppose the revenue, in dollars from sales of a product is a function of the unit price, in dollars that is charged. If the revenue is given by the function

$$R(p) = -\frac{1}{2}p^2 + 300p$$

a) What is the maximum revenue?_____

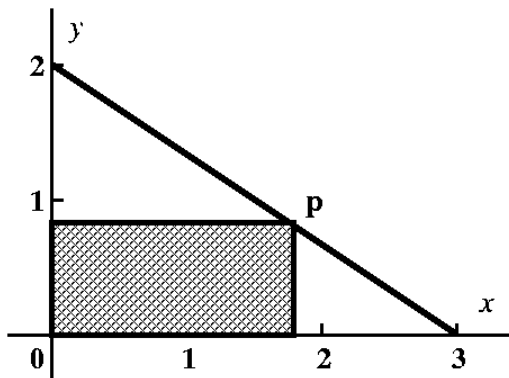
b) What price should be charged to achieve maximum revenue?_____

*Answer using appropriate units.

(6 points)

(11) A point $P(x,y)$ lies in the first quadrant on the graph of the line $y = 2 - \frac{2}{3}x$. From the point P , perpendiculars are drawn to both the x -axis and the y -axis. What are the dimensions of the rectangle of largest area thus formed?

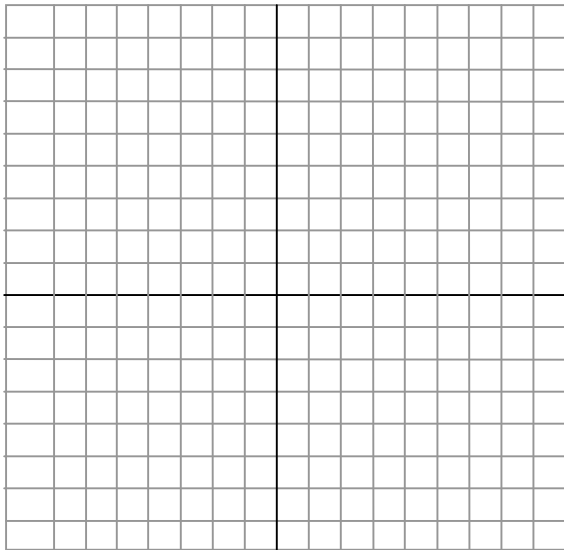
(Note. Don't be misled by the picture. P is not a fixed point, this is just one possible location for it)
(10 points)



(12) A piece of wire 20 inches long is cut into two pieces. The first is bent into a circle, the second is bent into an equilateral triangle. How should the wire be cut in order to minimize the total enclosed area. (10 points)

(13) Sketch the graph of $y = \frac{x^3}{2(x-1)^2(x+1)}$. Show any asymptotes. Be sure to show all work including discussion of asymptotes, intercepts, and behavior. Show scale.

(12 points)

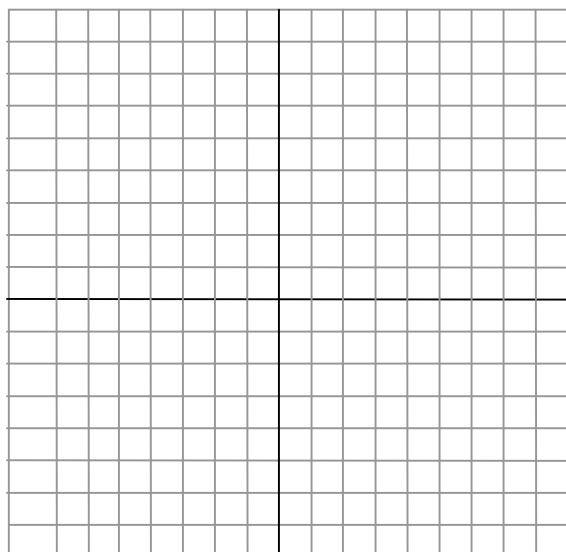


(14) Given the polynomial $f(x) = -4x^3 + 4x^2 + 7x + 2$

(12 points)

- (a) discuss end behavior
- (b) find the y intercept
- (c) find the x intercepts and discuss the behavior near them.
- (d) plot one additional point for accuracy and sketch the graph.

SHOW ALL WORK



(15) For each of the following angles, determine which quadrant it is and find the reference angle. Answer should be in the units given. 1 point each blank.

ANGLE	QUADRANT	REFERENCE ANGLE
220°		
100°		
92°		
-300°		
$8\pi / 7$		
$5\pi / 3$		
$11\pi / 10$		

(16) For each of the following, find 4 angles, one in each quadrant, having the given angle as a reference angle. Answer in the units given. 1 point each blank.

12°	
45°	
$\pi / 10$	
$2\pi / 5$	
1	