

Math 8: Exam 4

You will not receive full credit if you do not clearly show how you are obtaining your answers. Show all work on this exam; do not attach other work. Circle your answers.

1. The price p (in dollars) and the quantity x sold of a certain product obey the demand equation $p = -\frac{1}{10}x + 150$, $0 \leq x \leq 1500$. What is the maximum revenue for this product? (10 points)

2. Form a third degree polynomial $f(x)$ with real coefficients and 4 and $2i$ as zeros. (5 points)

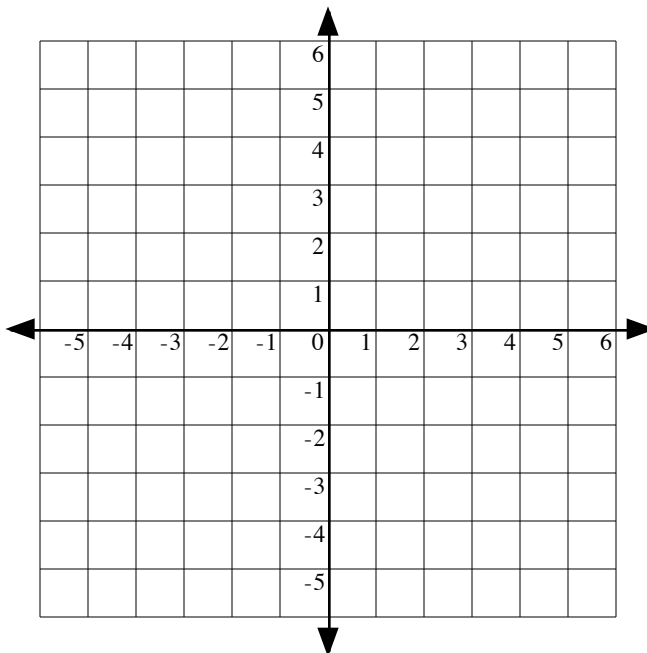
3. Consider the polynomial function $f(x) = -x^4 + 4x^2$ (15 points)

- a. Find the y-intercept of $f(x)$.
- b. Find any x-intercepts of $f(x)$, and determine whether the graph of f crosses or touches the x-axis at each x-intercept.

c. End behavior: find the power function that the graph of f resembles for large values of $|x|$.

d. Determine the maximum number of turning points on the graph of $f(x)$.

e. Sketch the graph of $f(x)$ on the coordinate plane. *If necessary, find a few additional points on the graph.*



4. Find the horizontal or oblique asymptote of $R(x) = \frac{3x^4 + 4}{x^3 + 3x}$. Write *none* if there is none. (5 points)

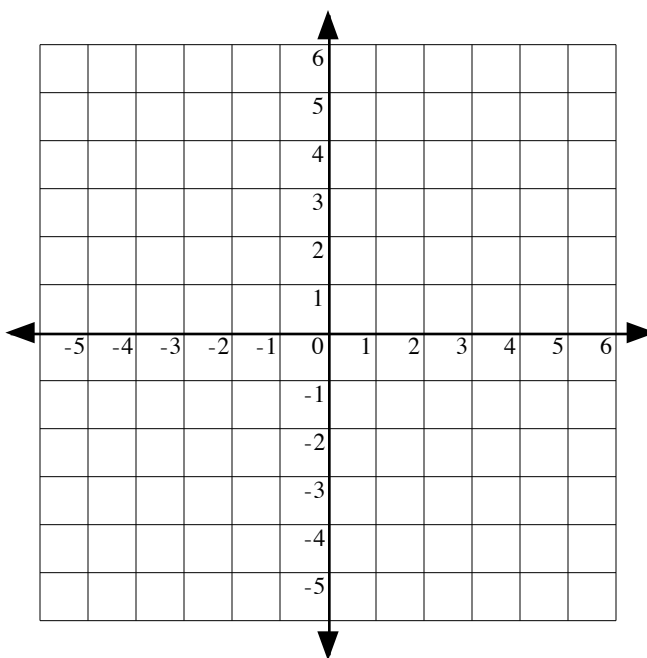
5. Solve and graph the solution set: $\frac{(x-1)(x+2)}{x-3} \leq 0$. (10 points)
Write your answer in interval notation.



6. Let $f(x) = \frac{2x^2 + 8x}{x^2 + 3x - 4}$. (15 points)

- a. Write the equations for any vertical asymptotes. If there aren't any then write *none*.
- b. Write the equation for the horizontal or oblique asymptote. If there isn't one then write *none*.
- c. Find the coordinates of any "holes" in the function. If there aren't any then write *none*.
- d. Find all intercepts for the graph of $f(x)$.

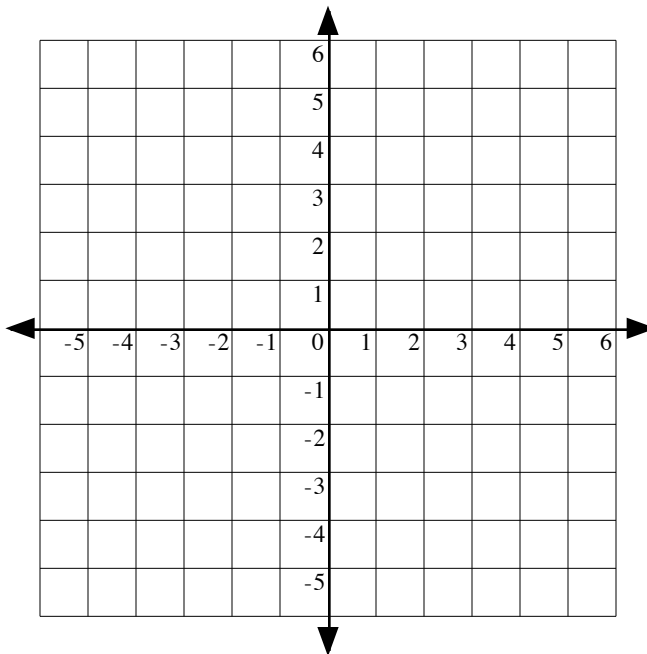
- e. Accurately graph $f(x)$. Be certain to draw all asymptotes, intercepts, and "holes." *Plot additional points on the graph if necessary.*



8. Consider the function $f(x) = -x^2 + 2x + 3$.

(15 points)

- a. Find the coordinates of the vertex.
Plot the vertex on the coordinate plane provided.



- b. Find the equation of the axis of symmetry. Graph the axis on the coordinate plane.
- c. Find all x and y intercepts.
- d. Graph the function. *Plot and label at least three points in addition to the vertex and intercepts.*
- e. State the domain and range of the function in set-builder notation.