Precalculus Test #2 Name:_____
Brewer Fall 2009

Read each question carefully. Show all work. Circle your final answer.

1. Given the polynomial $(x) = 2x^3 + x^2 + 18x + 9$,

a. (5 points) What does **Descartes' Rule of Signs** tell us about the number of positive real zeros and number of negative real zeros?

b. (3 points) List all **possible** rational zeros of the polynomial.

c. (5 points) Given that $-\frac{1}{2}$ is a zero of the polynomial, use synthetic division to **find all other zeros**.

d. (2 points) Write the polynomial as a product of linear factors.

2. Given the polynomial $(x) = -\frac{1}{3}\left(x + \frac{3}{2}\right)^2 (x-1)^3(x-2)^4$,

a. (5 points) Find the real **zeros** and state the **multiplicity** of each.

b. (5 points) State the **lead term** and make a sketch depicting the end behavior of the graph.

c. (3 points) State the y-intercept as an **ordered pair**.

d. (6 points) Graph the polynomial. **Label** x- and y-intercepts.

3. (8 points) **Find the equation of a polynomial** of lowest degree with $4, \sqrt{2}$, and $3 - 2i$ as three of its zeros. Leave your answer in factored form.

4.(8 points) Use the **intermediate value theorem** to determine if the function $f(x) = 4x^3 - 3x + 3$ has a zero between -2 and -1.

5.(8 points) Solve the polynomial inequality. Give your answer in interval notation.

$$4x^2 > 3x + 7$$

6. Given the rational function

$$f(x) = \frac{x^3 + 6x^2 - 4x - 24}{x^2 + 2x - 3}$$

a. (3 points) **Factor** the function completely.

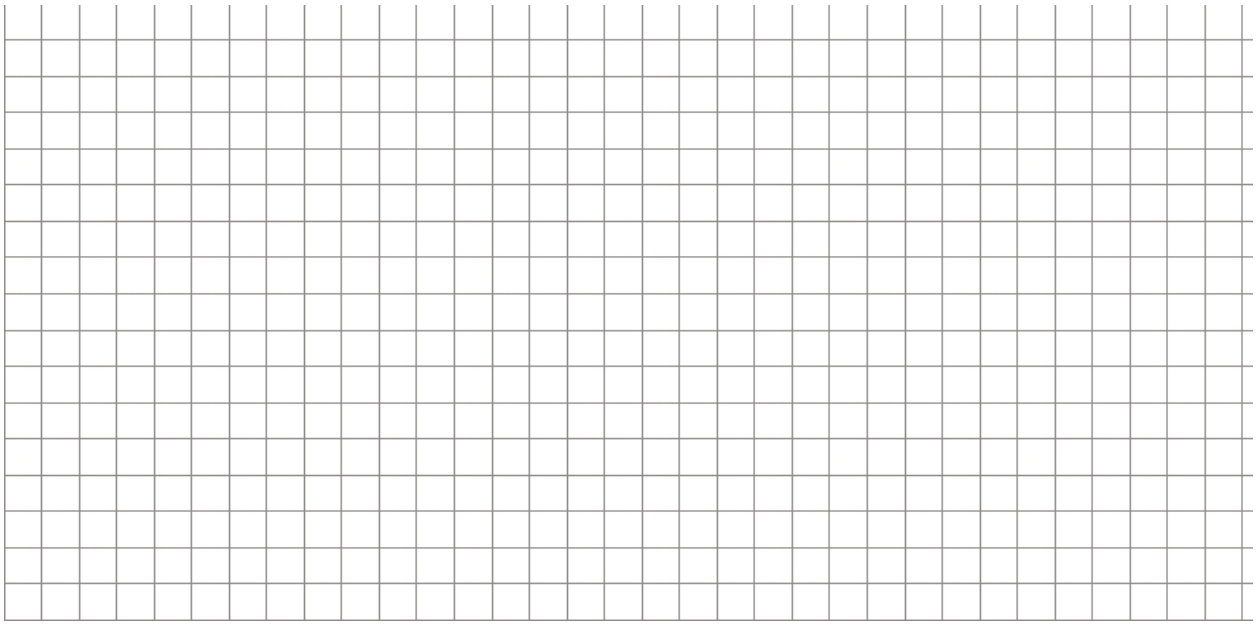
b. (5 points) State the real **zeros** and the **multiplicity** of each.

c. (2 points) State the y-intercept as an **ordered pair**.

d. (4 points) Find the **equation** of any vertical asymptotes of the function.

e. (5 points) Find the **equation** of any horizontal or oblique asymptotes.

f. (5 points) Graph the rational function. **Label** all x- and y-intercepts and any asymptotes.



7. (8 points) Solve the rational inequality. Give your answer in interval notation.

$$\frac{x-4}{x+2} \geq 3$$

8. (10 points) Find an equation of variation where *y* varies jointly as the square of *x* and the square of *z* and inversely as *w*, and *y* = 50 when *x* = 2 , *z* = 5 , and *w* = 10 .

Bonus (10 pts)
Write an equation for a rational function that satisfies the following criteria:
X-intercepts: none
Y-intercept: $(0, -8)$
Vertical Asymptotes: $x = -2, x = 1$
Horizontal Asymptote: $y = 3$