Honors Pre-Calculus
Review Guide: Ch 2 & 7.4

Name _____
Date _____ Block _____

1. Write an equation for the linear function f satisfying the conditions $f(1) = 5$ and $f(-2) = -3$.

2. Write an equation in vertex form for the quadratic function with vertex $(-1, -2)$ that passes through the point $(0, 4)$.

3. The perimeter of a rectangle is 66m. If the width were doubled and the length were increased by 7m, the perimeter would be 96m. What are the length and width of the rectangle?
   a. width: 11m, length: 16m
   b. width: 16m, length: 16m
   c. width: 8m, length: 25m
   d. width: 25m, length: 8m

4. Find a cubic function with the given zeros: $-2, -1 \pm \sqrt{7}$

5. Use the Factor Theorem to determine if $x - 2$ is a factor of $x^3 + 3x - 4$.

6. Find the remainder when $2x^5 - x^3 + 2$ is divided by $x + 2$.

7. Use long division to simplify and write in fraction form: $\frac{3x^4+2x^3-3x+1}{x^2+1}$.

8. Describe the end behavior of $f(x) = -(x-3)(x+1)(x+6)^2$ using limit notation.

9. Find all the real zeros of $f(x) = x^3 + 8x^2 + 17x + 6$ and classify each as rational or irrational.

10. Write a linear factorization of the function $g(x) = x^4 + 16x^3 + 65x^2 + 16x + 64$.

11. Given that $5 + 5i$ is a zero of $f(x) = x^4 - 18x^3 + 146x^2 - 560x + 800$, find all the other zeros.

12. Write $f(x) = x^4 - 10x^3 + 22x^2 - 10x + 21$ as a product of linear and irreducible quadratic factors with real coefficients.
    a. $f(x) = (x-7)(x-3)(x^2+1)$
    b. $f(x) = (x-7)^2(x^2+1)$
    c. $f(x) = (x+7)(x-3)(x^2+1)$
    d. $f(x) = (x-7)(x+3)(x^2+1)$

13. Write a polynomial function whose zeros are $\frac{3}{2}$, 3 (with a multiplicity of 2), and 0.

14. Solve: $\frac{6x}{x-6} - \frac{4}{x} = \frac{24}{x^2-6x}$
    a. $x = \frac{1}{3}, -\frac{1}{3}$
    b. $x = \frac{2}{3}, -\frac{2}{3}$
    c. $x = \frac{3}{2}$
    d. $x = \frac{2}{3}$

15. The total electrical resistance R of two resistors connected in parallel with resistances R_1 and R_2 is given by $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$. Find R_1 if $R_2 = 2$ ohms and $R = 1.2$ ohms.

16. Solve the inequality: $3 + \frac{14}{x} - \frac{5}{x^2} \leq 0$.

a. $\left[\frac{1}{3}, 5\right]$

b. $[-5, 0) \cup \left(0, \frac{1}{3}\right]$

c. $\left[-5, \frac{1}{3}\right]$

d. $(-\infty, -5) \cup \left[\frac{1}{3}, \infty\right)$

17. Solve the polynomial inequality: $2x^3 + 9x^2 - 53x - 210 > 0$

a. $(-\infty, -6) \cup \left(-\frac{7}{2}, 5\right)$

b. $(-\infty, -6] \cup \left[-\frac{7}{2}, 5\right]$

c. $\left(-6, -\frac{7}{2}\right) \cup (5, \infty)$

d. $\left[-6, -\frac{7}{2}\right] \cup [5, \infty)$

18. Find the partial fraction decomposition of $\frac{4x^2-2x+6}{(x^2-9)(x-1)}$

a. $\frac{5}{x^2-9} - \frac{1}{x-1}$

b. $\frac{5}{x-3} + \frac{3}{x+3} - \frac{2}{x-1}$

c. $\frac{2}{x-3} + \frac{3}{x+3} + \frac{1}{x-1}$

d. $\frac{3}{x-3} + \frac{2}{x+3} - \frac{1}{x-1}$

19. Find the partial fraction decomposition of $\frac{4x^2-30x+32}{(x+2)(x-4)^2}$

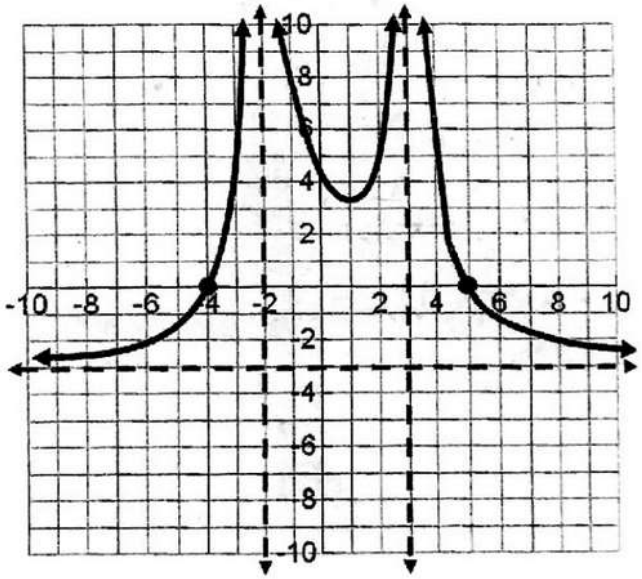
20. Find the partial fraction decomposition of $\frac{2x^3-7x^2+5x-3}{x^2+x-2}$

21. Graph the rational function $f(x) = \frac{x^3+x^2-2x+5}{x+2}$ on your calculator and find the domain, range, x-intercepts, y-intercept, vertical asymptotes (use limits to describe), horizontal asymptotes, other end behavior asymptotes, and use limits to describe the end behavior.

22. Let $x = 0$ represent the year 1990 in the table below. Find the quadratic regression model. Then, use the model to predict the y-value in the year 2006.

x	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
y	2300	2400	2400	2300	2300	2340	2470	2700	3000	3125	3300	3750	4000

23. Below is the graph of the rational function $f(x)$. Use it to evaluate the following:



$\lim_{x\to\infty} f(x) =$ _____ $\lim_{x\to 3^-} f(x) =$ _____

$\lim_{x\to\infty} f(x) =$ _____ $\lim_{x\to 3^+} f(x) =$ _____

$\lim_{x\to -2^-} f(x) =$ _____ $f(-4) =$ _____

$\lim_{x\to -2^+} f(x) =$ _____ $f(5) =$ _____

a. Write the equation(s) of the vertical asymptote(s) for the above function.

b. Write the equation(s) of the horizontal asymptote(s) for the above function.