Honors Pre-Calculus Chapter 2.4-2.7 Worksheet

1. Find a polynomial function that has the given zeros.

a) $x = 2, -1, -1$

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

b) $x = 5, 2i$

$f(x) = x^3 - 5x^2 + 4x - 20$

2. Find all zeros of the following:

a) $f(x) = x^2 - 3x - 28$

$x = 7, -4$

b) $f(x) = x^4 - x^3 - x + 1$

$x = 1, 1, \frac{-1 \pm i\sqrt{3}}{2}$

c) $f(x) = x^4 - 2x^3 - 10x^2 + 8x + 24$ given $x = 1 + \sqrt{7}$ is one zero

$x = 1+\sqrt{7}, 1-\sqrt{7}, 2, -2$

3. Perform the following. Put answers is standard form.

a) $\sqrt{-12} \cdot \sqrt{-3}$

-6

b) $(4 - 7i) + (9 + 10i)$

$13 + 3i$

c) $(5 + i)(3 - 2i)$

$17 - 7i$

d) $\dfrac{(3 - 5i)}{(2 + i)}$

$\frac{1}{5} - \frac{13i}{5}$

e) $\dfrac{2i}{2 + i} + \dfrac{5}{2 - i}$

$\frac{12}{5} + \frac{9}{5}i$

4. List the possible rational zeros of $7x^5 - 4x^4 + 8x^3 - x^2 - 24$

$x = \dfrac{\pm 1 \pm 2 \pm 3 \pm 4 \pm 6 \pm 8 \pm 12 \pm 24}{\pm 1 \pm 7}$

5. Use Descartes' Rule of Signs to determine the possible number of positive, negative, and imaginary zeros of $f(x) = -x^5 + 3x^4 + x^3 + 8x^2 + 1$

Pos	Neg	Imag
1	2	2
1	0	4

6. Find all zeros of the following and write it as a product of linear factors..

a) $f(x) = x^4 + 6x^3 + 10x^2 + 6x + 9$

$x = -3, -3, \pm i$

$(x+3)^2(x+i)(x-i)$

b) $f(x) = x^4 - x^3 - 8x^2 - 12x - 240$

$x = 5, -4, \pm 2i\sqrt{3}$

$(x-5)(x+4)(x-2i\sqrt{3})(x+2i\sqrt{3})$

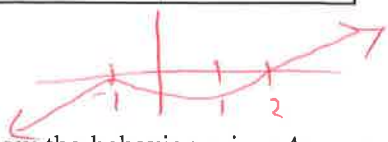
7. Use the information in the tabel to find the zero(s) of the function, the least possible degree and write a product of linear factors.

3

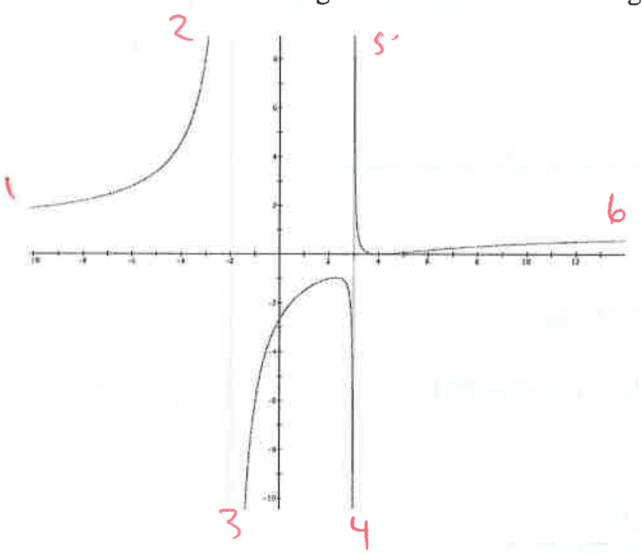
Zeros $x = -1, 2$

Interval	Value of f(x)
(-∞,-1)	Negative
(-1,2) ~~(-1,2)~~	Negative
(2, ∞)	Positive

$f(x) = (x+1)(x+1)(x-2)$



8. Show the behavior using *As* $x \rightarrow$ notation. The graph has a horizontal asymptote at y=1.



1 As $x \to -\infty$ $f(x) \to 1^+$

2 As $x \to -2^-$ $f(x) \to \infty$

3 As $x \to -2^+$ $f(x) \to -\infty$

4 As $x \to 3^-$ $f(x) \to -\infty$

5 As $x \to 3^+$ $f(x) \to \infty$

6 As $x \to \infty$ $f(x) \to 1^-$

9. Find a rational function that has a vertical asymptote at $x = -2$, a horizontal asymptote at $y = 2$ and a zero at $x = 5$.

$$r(x) = \frac{2(x-5)}{(x+2)}$$

10. Find all of the following that exist: domain, zeros, y intercept, asymptotes, P.O.D.

$$f(x) = \frac{x^4 - 5x^2 + 4}{x^2 + 4x + 3}$$

Domain $(-\infty, -3)(-3, -1)(-1, \infty)$

Zeros $x = -2, 1, 2$

y int $(0, \frac{4}{3})$

V.A. $x = -3$

H.A. None

P.A. $y = x^2 - 4x + 8$

P.O.D. $x = -1$

11. Write the partial fraction decomposition for the rational expression. $\dfrac{5x^3 - 3x^2 + 2x + 1}{x^4 + x^2}$

$$\frac{5x^3 - 3x^2 + 2x + 1}{x^4 + x^2} = \frac{2}{x} + \frac{1}{x^2} + \frac{3x - 4}{x^2 + 1}$$