

Name: _____

Period: _____

PC 2-Review Show work on all problems

1) Consider the polynomial function f with a root of $3i$. Find and list all roots.

$$f(x) = x^4 + 4x^3 + 13x^2 + 36x + 36$$

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

$3i$	$-3i$	9
x	x^2	$3ix$

$$(x^2+9)(??) = f(x)$$

9	$9x^2$	$36x$	36
x^2	x^4	$4x^3$	$4x^2$

$$(x^2+9)(x^2+4x+4)$$

$4x^2$	$2x$	4
$2x$	x^2	$2x$

$$(x^2+9)(x+2)(x+2)$$

$$x = \{-3i, 3i, -2\}$$

2) Write the equation of the polynomial in **factored form** given the description:

a) Degree 7

Zeros: 4 (multiplicity 2)

2

-6 (multiplicity 4)

$$y = (x-4)^2(x-2)(x+6)^4$$

b) Degree 4

Zeros: $7i$

0

-12

$$y = (x-7i)(x+7i)(x)(x+12)$$

3) Given a polynomial with the roots shown below, write a possible polynomial in standard form.

$$x = \{3, 5+2i, 5-2i\}$$

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

$2i$	$2ix$	$10x$	4
$.5$	$.5x$	25	$-10i$
x	x^2	$-5x$	$2ix$

$$(x-3)(x^2-10x+29)$$

-3	$-3x^2$	$30x$	-87
x	x^3	$-10x^2$	$29x$

$$y = x^3 - 13x^2 + 59x - 87$$

4) Given $g(x) = 3x^4 - 3x^3 + 2x^2 + x + 10$

a) Use Descartes Rule of Signs to determine the number of positive, negative, and imaginary roots.

$$g(-x) = 3x^4 + 3x^3 + 2x^2 - x + 10$$

$+$	$-$	i
2	2	0
0	2	2
2	0	2
0	0	4

b) Use the Rational Zeros Theorem to create a list of potential rational zeros.

$$\frac{10}{3} \Rightarrow \frac{\pm 1, \pm 2, \pm 5, \pm 10}{\pm 1, \pm 3}$$

$$\pm 1, \pm \frac{1}{3}, \pm 2, \pm \frac{2}{3}, \pm 5, \pm \frac{5}{3}, \pm 10, \pm \frac{10}{3}$$

5) Given $h(x) = x^3 - x^2 - 10x - 8$, determine if $(x+4)$ is a factor of $h(x)$.

4	$4x^2$	$-20x$	40
x	x^3	$-5x^2$	$10x$

$$x^2 - 5x + 10$$

No, it is not a factor.

6) Given $R(x) = \frac{x^2+5x-6}{x^2-x-20}$, find the following. If none, write 'none'.

a) x-intercept(s)

$$0 = x^2 + 5x - 6$$

-1	-1x	-6
x	x ²	6
	x	6

$(x-1)(x+6) = 0$

$(1, 0), (-6, 0)$

b) y-intercept(s)

$$\frac{0^2 + 5(0) - 6}{0^2 - 0 - 20} = \frac{-6}{-20}$$

$(0, \frac{3}{10})$

c) vertical asymptote(s)

$$x^2 - x - 20 = 0$$

-1	-1x	-20
x	x ²	20
	x	20

$x = 5, x = -4$

d) Horizontal asymptote

$y = 1$

e) Oblique Asymptote

None

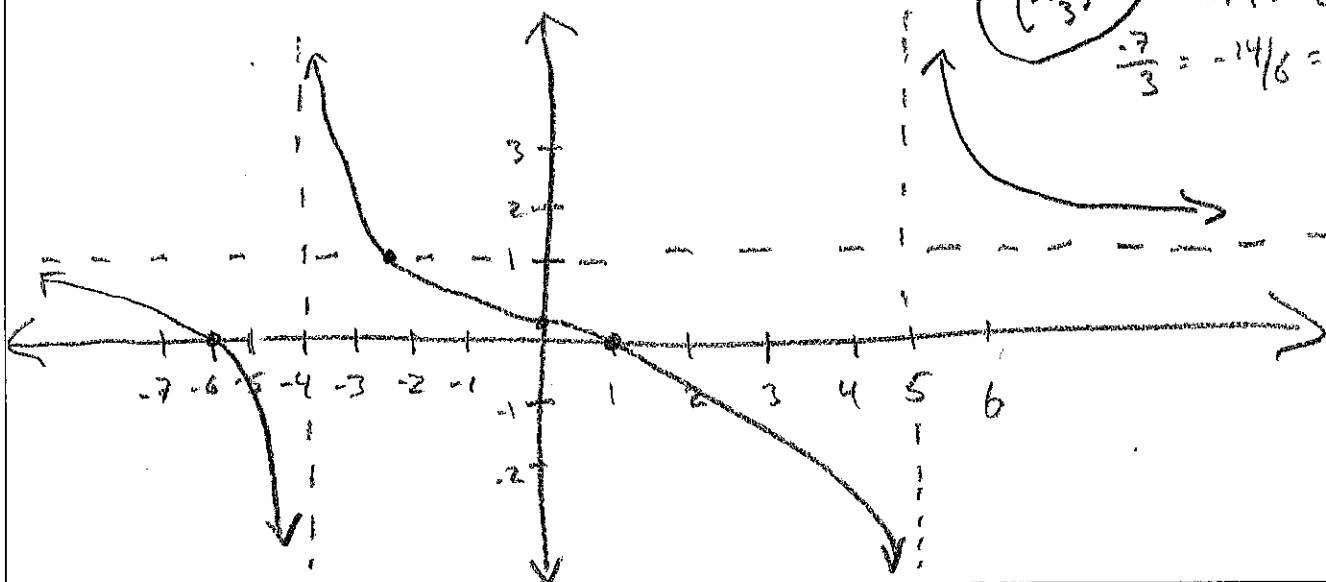
f) POI with the graph and any horizontal/oblique asymptotes

$$1 = \frac{x^2 + 5x - 6}{x^2 - x - 20}$$

$$x^2 - x - 20 = x^2 + 5x - 6$$

$$-x - 20 = 5x - 6$$

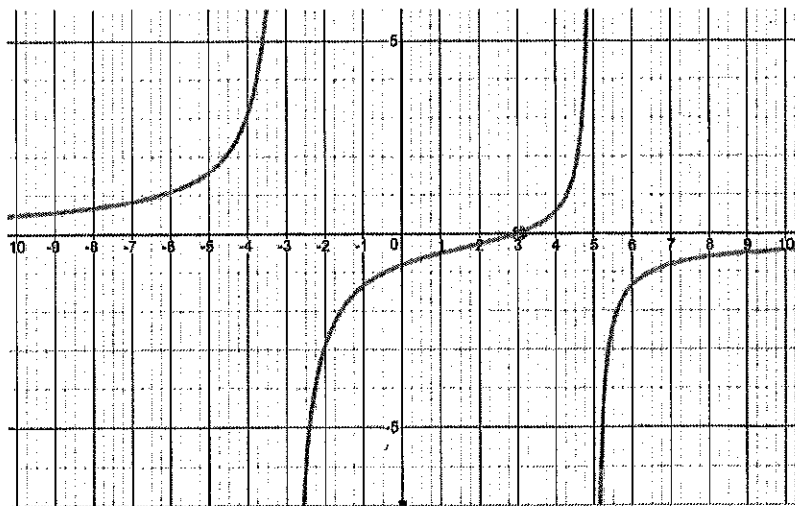
g) Graph $R(x)$ using your answers.



7) A function has a horizontal asymptote at 6. It also has vertical asymptotes at 4 and -7. It crosses the x-axis at -2. Write the equation that follows those constraints.

$$y = \frac{6(x+2)^2}{(x-4)(x+7)}$$

8) Given the graph, write a possible equation of rational function.



$$y = \frac{x-3}{(x+3)(x-5)}$$