Name KEY
Date _____ Pd ____

PRACTICE MIDTERM III

Part I – Calculator

1. Form a polynomial (with smallest degree possible) with the given information.

Zeros: -4 multiplicity 1, -3 multiplicity 3 and goes through the point (-2, 8).

$f(x) = a(x+4)^1(x+3)^3$

$8 = a(-2+4)(-2+3)^3$

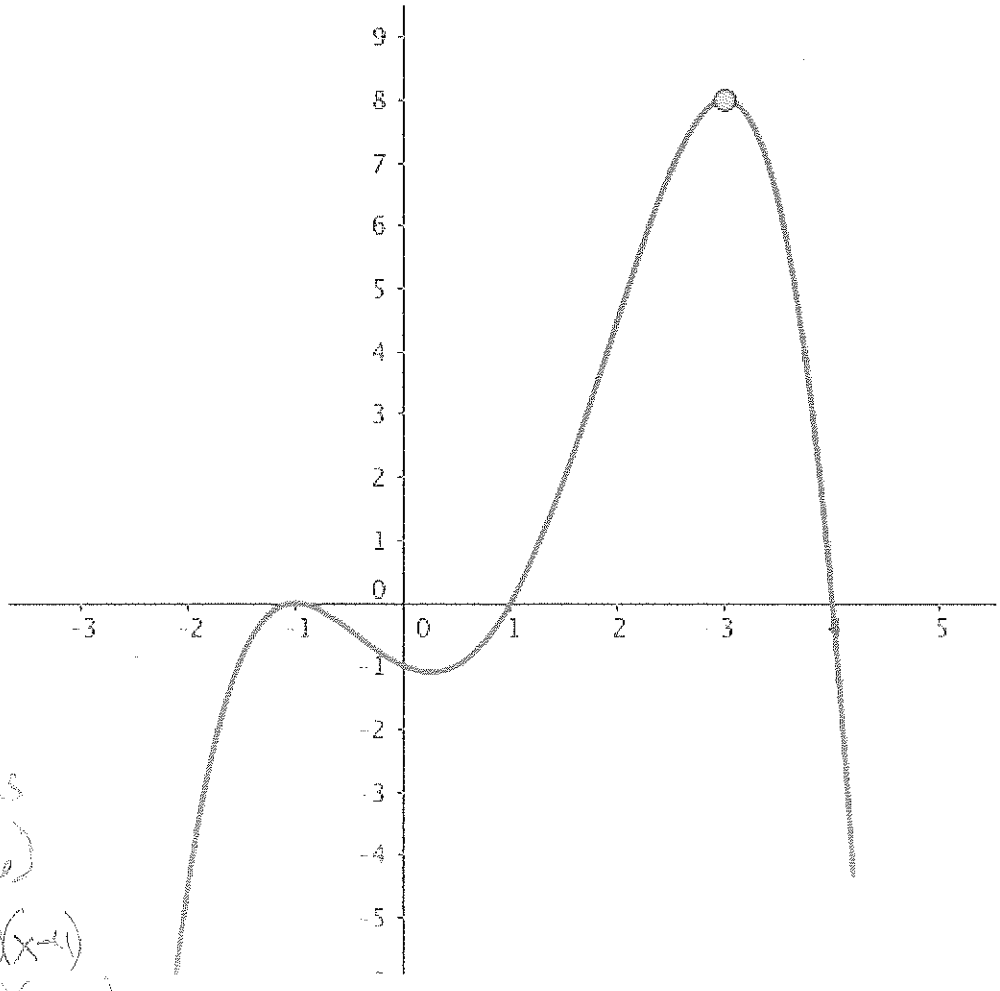
$8 = a(2)(1)$

$8 = 2a$

$a = 4$

$f(x) = 4(x+4)(x+3)^3$

2. Write a polynomial function whose graph is below. Use the smallest degree possible.



Zeros	m	+/c
-1	2	t
1	1	c
4	1	c

$n - 1 = 3$ max turns

$\therefore n = 4$ (max degree)

$f(x) = a(x+1)^2(x-1)(x-4)$

$8 = a(3+1)^2(3-1)(3-4)$

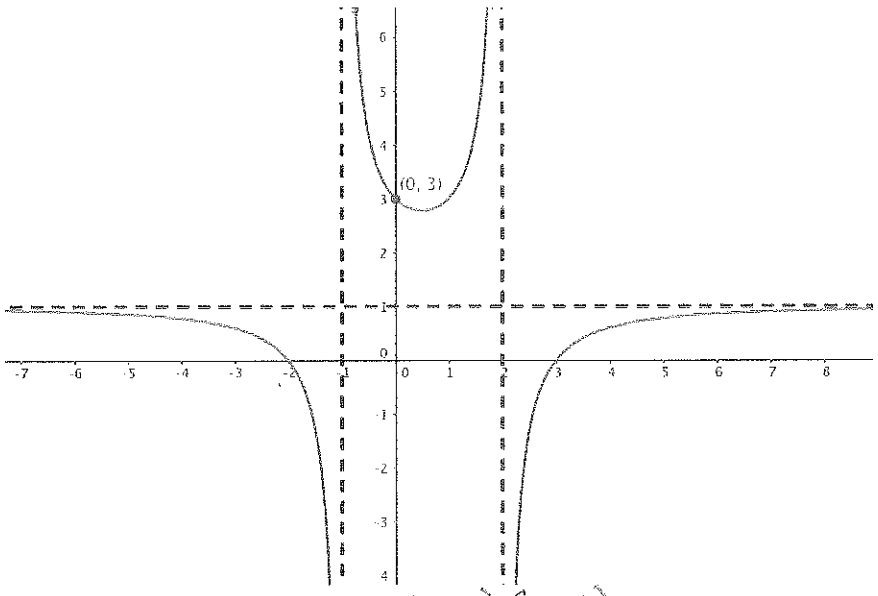
$8 = a(16)(2)(-1)$

$8 = -32a$

$a = -\frac{1}{4}$

$f(x) = -\frac{1}{4}(x+1)^2(x-1)(x-4)$

3. Find a possible formula for the graph below.



reduced to lowest terms

VA @ $x = -1, 2$

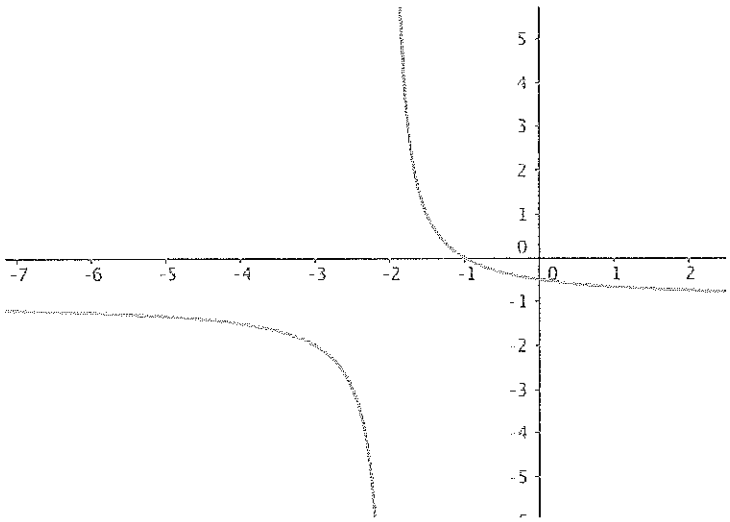
HA @ $y = 1 \Rightarrow n = m$

zeros	m	+/C
-2	1	C
3	1	C

dictates numerator

$$R(x) = \frac{(x+2)(x-3)}{(x+1)(x-2)}$$

4. Use knowledge of transformations to write an equation of the graph below.



$\frac{1}{x}$ 

$-\frac{1}{x}$ 

v. shift down 1 $\Rightarrow -\frac{1}{x} - 1$

h. shift left by 2 $\Rightarrow -\frac{1}{(x+2)} - 1$

$$f(x) = -\frac{1}{(x+2)} - 1$$

5. State the domain, horizontal asymptote(s), and vertical asymptote(s) of *h(x)*.

$$h(x) = \frac{2(x-1)^2}{(x+1)(x-3)}$$

Domain:

$x+1 \neq 0 \quad x-3 \neq 0$

$x \neq -1 \quad x \neq 3$

D: $\{x \mid x \neq -1, x \neq 3\}$

VA (put in reduced form)

$h(x) = \frac{2(x+1)(x-1)}{(x+1)(x-3)}$

$= \frac{2(x-1)}{(x-3)}$ V.A. @ $x = 3$

NA

$n = m$

$\therefore y = \frac{2}{1} = 2$

HA @ $y = 2$

PreCalc

Name_____

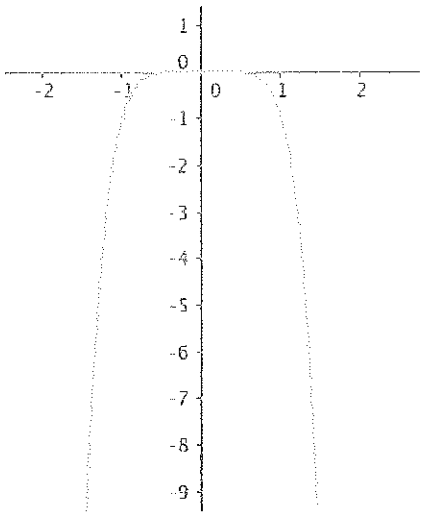
Date_____Pd_____

PRACTICE MIDTERM III

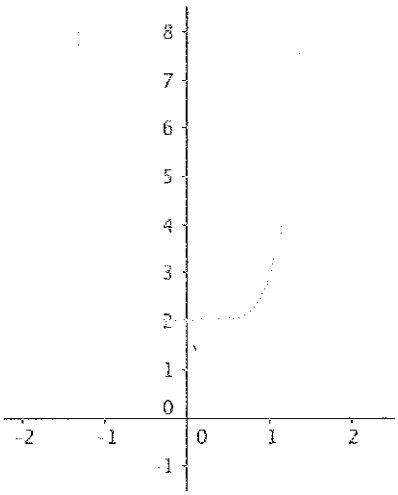
Part II – No Calculator

1. Match the polynomial to the graph by writing the corresponding **letter** beneath the graph.

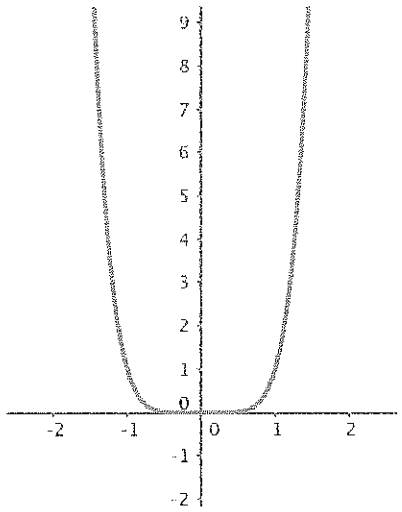
a. $2 - x^6$ b. x^6+2 ***c.*** $-x^6$ ***d.*** $(x-1)^6$ ***e.*** x^6 ***f.*** $(x+1)^6$



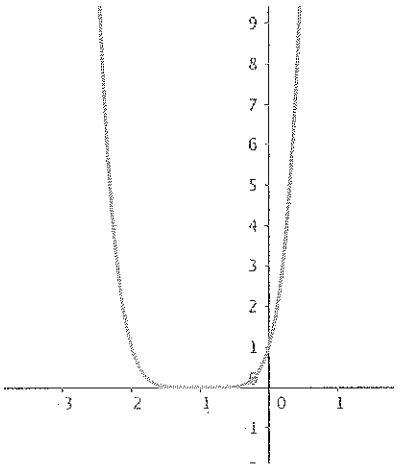
c



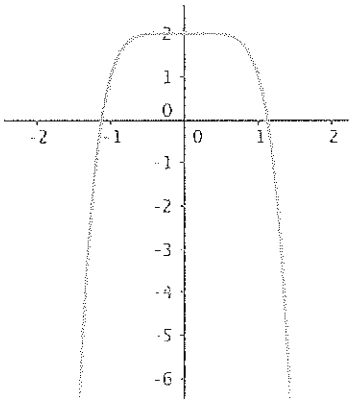
b



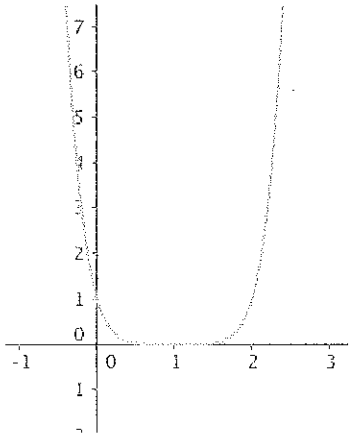
e



f



a



d

2. Analyze $g(x)$, as indicated below. Clearly label & respond to each step (a-e).

$$g(x) = x^2(x-2)(x+2)$$

a. Determine the end behavior of the graph.
b. Find the x- and y- intercepts of the graph of the function.
c. Determine the zeros and their multiplicities. State whether the graph crosses or touches at each zero.
d. Determine the maximum number of turning points on the graph of the function.
e. Sketch the graph of the function.

a) power function: x^4 $x \to \infty, g(x) \to \infty$ "up", $x \to -\infty, g(x) \to \infty$ "up"

b) x int when $y = 0$

$x^2(x-2)(x+2) = 0$

$x^2 = 0 \quad x-2 = 0 \quad x+2 = 0$

$x = 0, 2, -2$

y int when $x = 0$

$y = 0^2(0-2)(0+2)$

$y = 0$

c)

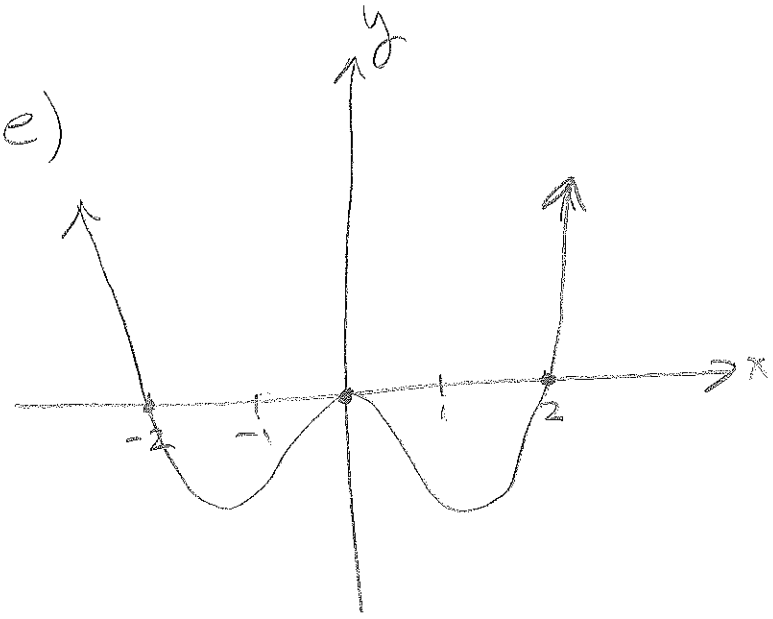
z	m	+/c
0	2	+
2	1	c
-2	1	c

d) max t.p: n-1

n = degree = 4

$\therefore 4-1 = 3$

e)



3. Analyze $R(x)$, as indicated below. Clearly label & respond to each step (a-f).

$$R(x) = \frac{(x+2)(x-1)}{(x-4)(x+1)}$$

a. State the domain.
b. State the x- and y-intercepts of the graph.
c. Find the vertical and horizontal asymptotes.
d. Find the zeros, their multiplicities, and behavior (touch or cross).
e. Determine intervals where the graph is above or below the x-axis.
f. Graph $R(x)$.

a) $(x-4)(x+1) \neq 0$

$x-4 \neq 0 \quad x+1 \neq 0$

$x \neq 4, x \neq -1$

D: $\{x \mid x \neq -4, x \neq -1\}$

b) x int when $y=0$ (use numerator)

$(x+2)(x-1)=0$

$x=-2, x=1$

y int when $x=0$

$y = \frac{(0+2)(0-1)}{(0-4)(0+1)} = \frac{-2}{-4} = \frac{1}{2}$

$y = 1/2$

c) V.A. (use reduced form + denominator)

$x=4, x=-1$

H.A. $(n=m)$ $\therefore$ HA = $\frac{\text{coeff}}{\text{coeff}}$

$y = \frac{1}{1} = 1$

d)

	2	m	4
	-2	1	c
	1	1	c

e) Use x-int + VA for intervals

$(-\infty,-2)$	$(-2,-1)$	$(-1,1)$	$(1,4)$	$(4,\infty)$
+	−	+	−	+