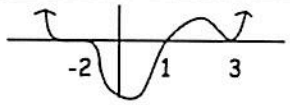
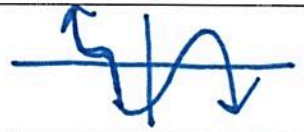
Polynomial Behavior WS
PAP Algebra 2

Name: Mrs. Benton

Sketch the graph on the chart. (Do not worry about scale.) Fill in the remaining columns of the chart based on your graph.

Function	Graph of f(x)	Roots, Multiplicity and Type of Behavior			Term of Highest Degree	End Behavior	
					ax^n	$x \to -\infty$	$x \to \infty$
1. $f(x)=(x+2)^3(x-1)(x-3)^2$		$x=-2$ m=3 Twist	$x=1$ m=1 Thru	$x=3$ m=2 Bounce	$1x^6$	UP	UP
2. $f(x)=(x+2)^2(x-1)(x-3)^2$		x=-2 Bounce	x=1 cross	x=3 Bounce	$1x^5$	down	up
3. $f(x)=(x+2)(x-1)^3(x-3)^2$		x=-2 cross	x=1 twist	x=3 Bounce	$1x^6$	up	up
4. $f(x)=(x+2)(x-1)^4(x-3)^2$		x=-2 cross	x=1 Bounce	x=3 Bounce	$1x^7$	down	up
5. $f(x)=(x+2)^2(x-1)(x-3)$		x=-2 Bounce	x=1 cross	x=3 cross	$1x^4$	up	up
6. $f(x)=-(x+2)^5(x-1)(x-3)$		x=-2 twist	x=1 cross	x=3 cross	$-1x^7$	up	down
7. $f(x)=2(x+2)(x-1)^2(x-3)$		x=-2 cross	x=1 Bounce	x=3 cross	$2x^4$	up	up
8. $f(x)=-2(x-1)^3$			x=1 twists		$-2x^3$	up	down

PAP Algebra 2 Ch. 4 Review

Name: Mrs. Benton

1. Complete the charts below.

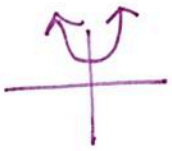
Quadratics	
Odd or Even Symmetry	Even
End behaviors	↑↑ or ↓↓
# of roots	0, 1, 2
Possible # of extrema	1
Absolute maximum or minimum	possible
domain	ℝ
range	depends on max or min

Cubics	
Odd or Even Symmetry	odd
End behaviors	↓↑ or ↑↓
# of roots	1, ~~2~~, 3
Possible # of extrema	2, 0
Absolute maximum or minimum	NO
domain	ℝ
range	ℝ

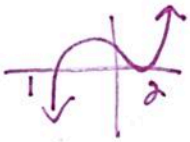
Quartics	
Odd or Even Symmetry	even
End behaviors	↑↑ or ↓↓
# of roots	0, 1, 2, 3, 4
Possible # of extrema	3, 1
Absolute maximum or minimum	possible
domain	ℝ
range	Depends on ABS. Extrema

Quintics	
Odd or Even Symmetry	odd
End behaviors	↓↑ or ↑↓
# of roots	1, 2, 3, 4, 5
Possible # of extrema	4, 2, 0
Absolute maximum or minimum	NO
domain	ℝ

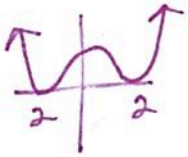
Sketch a Quadric with zero roots.



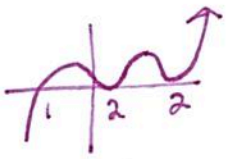
Sketch a Cubic with two roots.



Sketch a Quartic with exactly 2 roots.



Sketch a Quintic with 3 roots.



Given the equations in factored form, answer the questions.

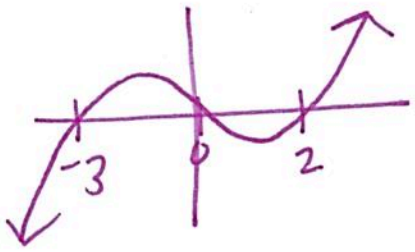
2. $y = 3x(x+3)(x-2)$

Roots: $x = 0, -3, 2$

Write the multiplicity under each root.

End behavior ↓↑

Sketch the graph.



$(3x^2+9x)(x-2)$

Standard form: (Show Work!)

	$3x^2$	$+9x$
x	$3x^3$	$9x^2$
-2	$-6x^2$	$-18x$

$y = 3x^3 + 3x^2 - 18x$

3. $Y = (1-2x)(2x+1)(x+4)$

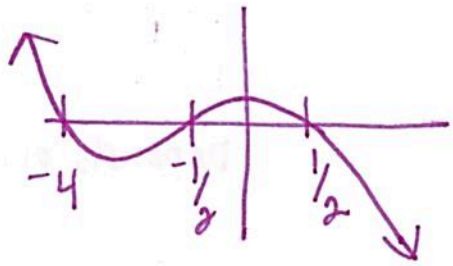
$1-2x=0$

Roots: $x = 1/2, -1/2, -4$

Write the multiplicity under each root.

End behavior ↑↓

Sketch the graph.



Standard form: (Show Work!)

	$2x$	$-4x^2$
$+1$	1	$-2x$

	$-4x^2$	$+1$
x	$-4x^3$	x
$+4$	$-16x^2$	4

$y = -4x^3 - 16x^2 + x + 4$

$(2x+1)(2x+1)(2x+1)$

4. $y = (2x + 1)(4x^2 + 4x + 1)$

	$2x+1$	
$2x$	$4x^2$	$2x$
$+1$	$2x$	1

4

Roots:

$x = -\frac{1}{2}$

$m = 3$

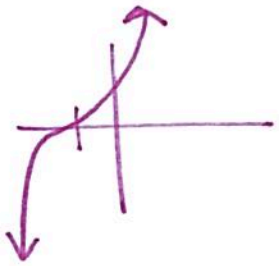
5. $y = -7x(x + 5)^2$

Roots: $x=0$, $x=-5$ (1, 2)

Write the multiplicity under each root.

End behavior ↓↑

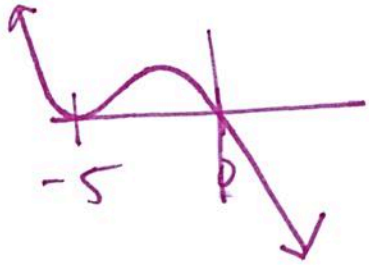
Sketch the graph.



Write the multiplicity under each root.

End behavior ↑↓

Sketch the graph.



Standard form: (Show Work!)

	$4x^2$	$4x$	1
$2x$	$8x^3$	$8x^2$	$2x$
$+1$	$4x^2$	$4x$	1

$y = 8x^3 + 12x^2 + 6x + 1$

Standard form: (Show Work!)

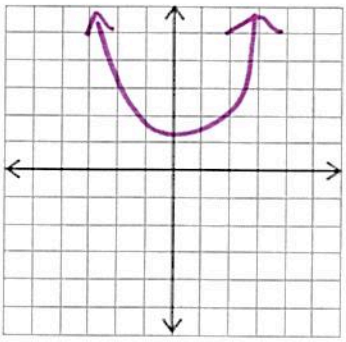
	$x+5$	
x	x^2	$5x$
$+5$	$5x$	25

$-7x(x^2+10x+25)$

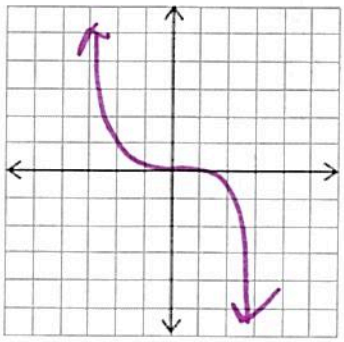
$y = -7x^3 - 70x^2 - 175x$

Sketch the graph of $f(x)$ and describe the end behavior of each graph.

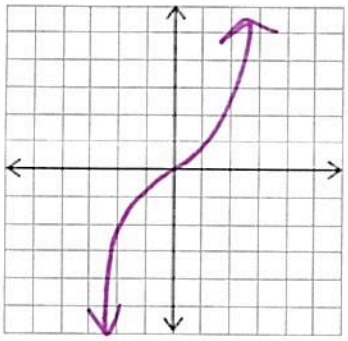
6. x^4



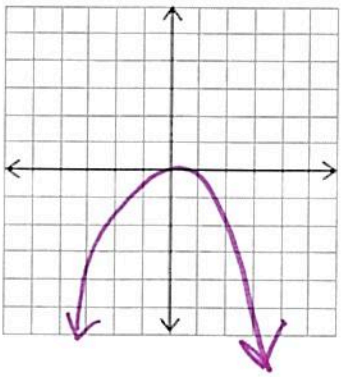
7. $-x^5$



8. x^3



9. $-x^2$



10. Describe transformations happening from f(x). Write a cubic function to represent each and complete a table to 3 points on the graph.

a. $g(x) = -2f(x) - 3$

V. Stretch
V. Reflection
down 3

$y = -2(x)^3 - 3$
or
$y = -2x^3 - 3$

b. $g(x) = f(-2x) + 3$

H. Reflection
H. Comp
up 3

$y = (-2x)^3 + 3$

c. $g(x) = \frac{1}{2} f(x-5) - 2$

V. comp
right 5
down 2

$y = \frac{1}{2}(x-5)^3 - 2$

11. Describe the transformations from p(x) to m(x).

d. $p(x) = x^5;\ m(x) = 0.5p(-x) + 4$

V. Comp
H. Reflection
up 4

e. $p(x) = x^4;\ m(x) = -p(0.5x) + 2$

V. Reflection
H. Stretch
up 2

12. List the number of possible extrema for each polynomial.

a. 3rd degree polynomial 2 turn, 0

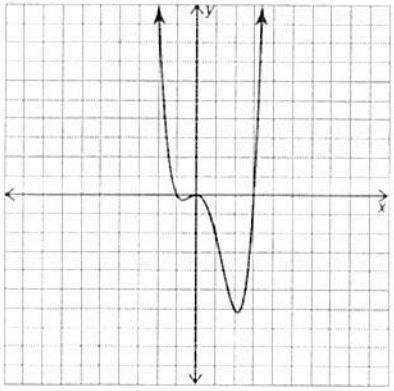
b. 4th degree polynomial 3, 1

c. 8th degree polynomial 7, 5, 3, 1

d. 15th degree polynomial 14, 12, 10, 8, 6, 4, 2, 0

Circle the function(s) that could model each graph. Describe your reasoning for either eliminating or choosing each function.

13.

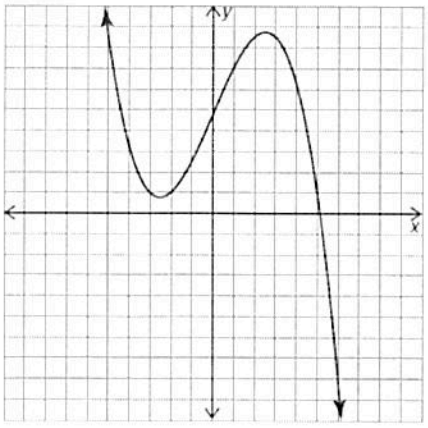


$f(x) = x^4 - 2x^3 - 3x^2$

$f(x) = -2x^4 - 3x^2 - x$ opens up

$f(x) = 2(x-2)(x+3)(x+1)$ cross @ all roots

14.



$f(x) = 4x^6 + 2x^3 - 1$ odd degree

$f(x) = (x+2)(x-5)(x+3)+2$

$f(x) = -0.25(x+2)(x-5)(x+3)+2$ up 2

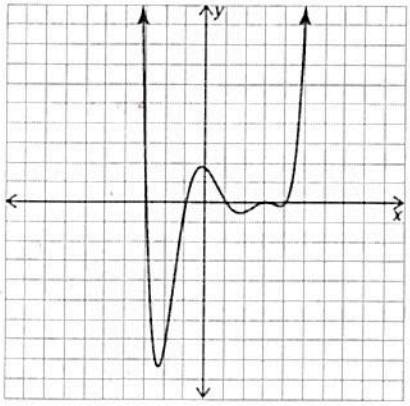
Ends going ↓

15.

$f(x) = -2x^6 - 13x^5 + 20x$ Negative

$f(x) = 2x^6 - 13x^5 + 26x^4 - 7x^3 - 28x^2 + 20x$

$f(x) = 2x(x+7)(x-4)(x+3)(x-2) - 3$ = degree 5



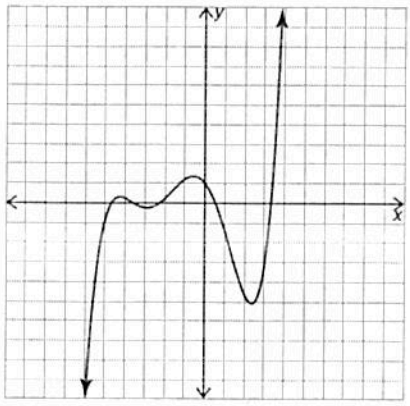
16.

$f(x) = 3x^5 + 20x^4 - 10x^3 - 240x^2 - 250x + 200$

$f(x) = (2x-3)(x+4)(x-10)(x+14) + 20$ = degree 4

$f(x) = -3x^7 + 15x^6 - 20x^2 + 125x - 150$

Neg

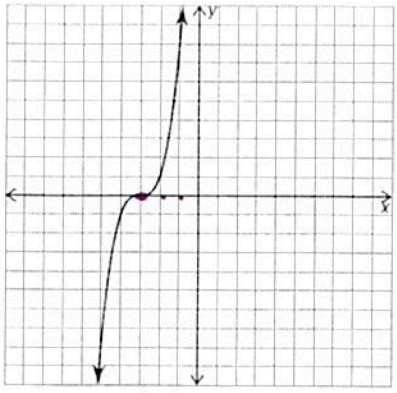


17.

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

$f(x) = \frac{1}{2}x(x+3)^3$ = degree 4

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



18.

$f(x) = x^4 - 4x^3 - 2x^2 + 12x - 3$

$f(x) = 2(x+3)(x+4)$ = degree 2

$f(x) = -2x^5 + x^4 - 3x^3 + 12$ Neg degrees