Bell work

Solve for x by factoring:

1. $6x^2 + 7x - 3 = 0$

$1 \cdot 6$
$2 \cdot 3$ $\quad 1 \cdot 3$

$(2x+3)(3x-1)=0$

$2x+3=0$
$-3 \quad -3$
$\frac{2x}{2} = \frac{-3}{2}$
$x = -\frac{3}{2}$

$3x-1=0$
$+1 \quad +1$
$\frac{3x}{3} = \frac{1}{3}$
$x = 1/3$

2. $25 - 4x^2 = 0$

$-4x^2+25=0$
$-1(4x^2-25)=0$
$5 \cdot 5 \quad 2 \cdot 2 \cdot x \cdot x$

$(5+2x)(5-2x)=0$

$5+2x=0$
$-5 \quad -5$
$2x=-5$
$x=-\frac{5}{2}$

$5-2x=0$
$-5 \quad -5$
$-2x=-5$
$x=5/2$

3. $4x^2 - 35x - 9 = 0$

$(4x+1)(x-9)=0$

$4x+1=0$
$4x=-1$
$x=-1/4$

$x-9=0$
$x=9$

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

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

$x=-6$ $\quad x=1$

Polynomial function

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$$

leading coefficient: a_n
degree: n
constant term: a_0

Degree	Type	Example
0	constant	$y = 5x^0$ or $y = 5$
1	linear	$y = x^1$ $y = 3x + 4$
2	quadratic	$y = x^2$ $y = 3x^2 + 2x - 4$
3	cubic	$y = 4x^3 + 2x$ $y = 3x^3(5) = 15x^3$
4	quartic	$y = x^4$ $y = 2x^4 + 2$
5	quintic	$y = x^5$ $y = x^5 + 2x$

Polynomial Function

Whole Number Exponents on the variables
(in standard form the powers are decreasing)

Leading Coefficient: # in front of the variable term with biggest exponent

Remember

No Negative or Fractional Exponents on the variables

No Variable Exponents

1. Create a degree 3 $\underbrace{\text{binomial}}_{\text{2 terms}}$ with a leading coefficient of 7 in standard form.

$f(x) = 7x^3 + 4$

$f(x) = 7x^3 + 8$

$f(x) = 7x^3 + 5$

$f(x) = 7x^3 + x^2$

$f(x) = 7x^3 - 2x$

2. Create a degree 5 trinomial with a leading coefficient of -1 in standard form.

$f(x) = -1x^5 - 3x^3 + 2x^2$

$f(x) = -x^5 + 7x^3 - 5$

Direct Substitution:

3. $f(x) = x^4 + 2x^3 + 3x^2 - 7$ when $x = -2$

$x = -2$

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

$f(-2) = 5$

$(-2, 5)$

4. $g(x) = x^3 - 5x^2 + 6x + 1$ when $x = 4$

$g(4) = (4)^3 - 5(4)^2 + 6(4) + 1$

$g(4) = 9$

$(4, 9)$

Synthetic Substitution / Division

5. $f(x) = x^4 + 2x^3 + 3x^2 - 7$ when $\boxed{x = -2}$

$f(-2) = 5$

-2	1	2	3	0	-7
	↓	-2	0	-6	12
	1	0	3	-6	5

remainder

6. $g(x) = x^3 - 5x^2 + 6x + 1$ when $\boxed{x = 4}$

4	1	-5	6	1
	↓	4	-4	8
	1	-1	2	9

remainder

$f(4) = 9$

Synthetic Substitution / Division

7. $f(x) = 5x^3 + 3x^2 - x + 7$ when $x = -2$

$f(-2) = -19$

8. $g(x) = 2x^4 - 5x^3 - 4x + 8$ when $x = 3$

$f(3) = 23$

End Behavior

Degree odd & leading coefficient positive:

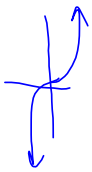
as $x \to \infty$ $f(x) = +\infty$

as $x \to -\infty$ $f(x) = -\infty$

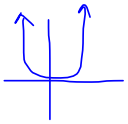
$y = x$

$y = x^2$

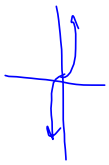
$y = x^3$



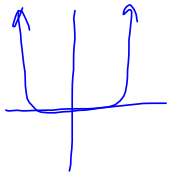
$y = x^4$



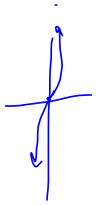
$y = x^5$



$y = x^6$

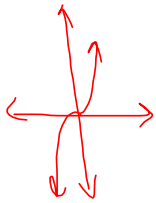


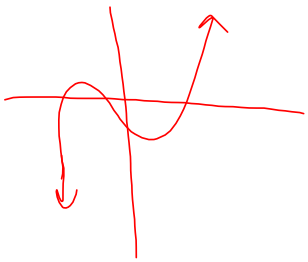
$y = x^7$



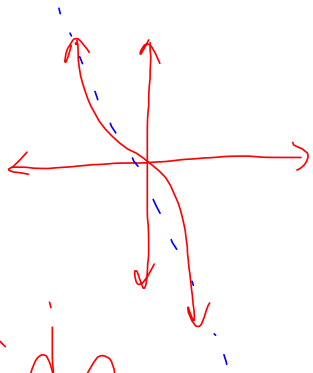
Degree odd & leading coefficient negative:

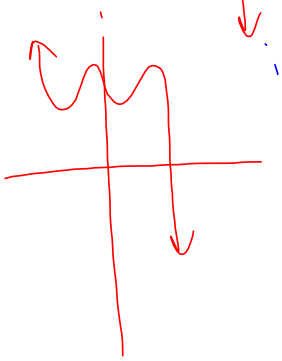
degree odd (+) L.C.



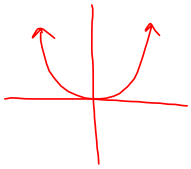


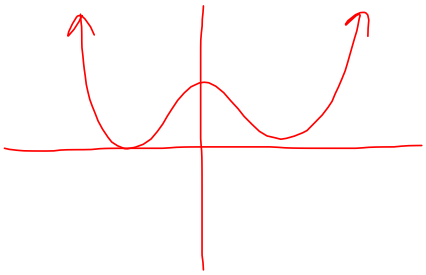
degree odd (−) L.C.



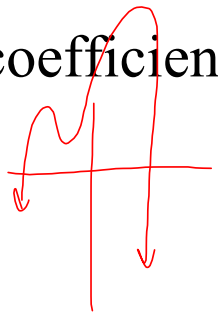


degree is even and leading coefficient is positive





degree is even and leading coefficient is negative



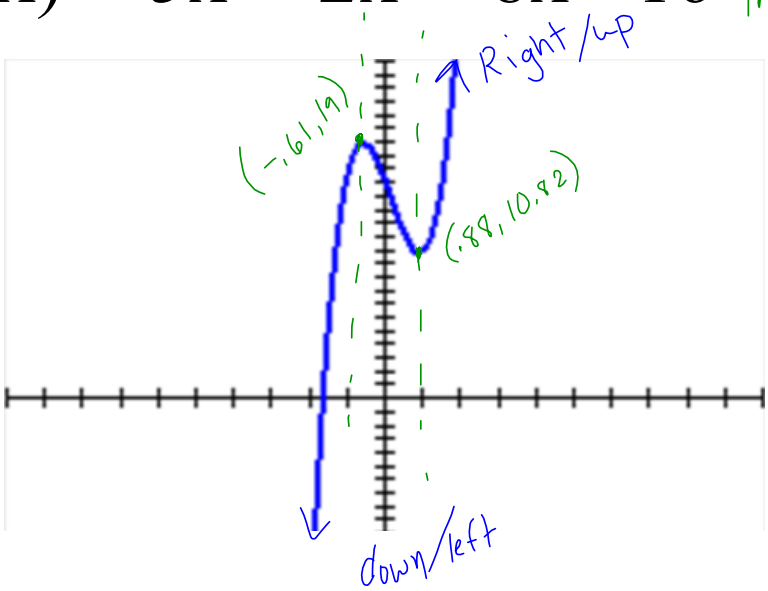
Graph the polynomial and state the interval where it is increasing and decreasing.
Describe the end behavior.

$x \to -\infty \quad y \to -\infty$

$x \to \infty \quad y \to \infty$

9. $f(x) = 5x^3 - 2x^2 - 8x + 16$

increase $(-\infty, -.61) \cup (.88, \infty)$



Pull

decrease $(-.61, .88)$

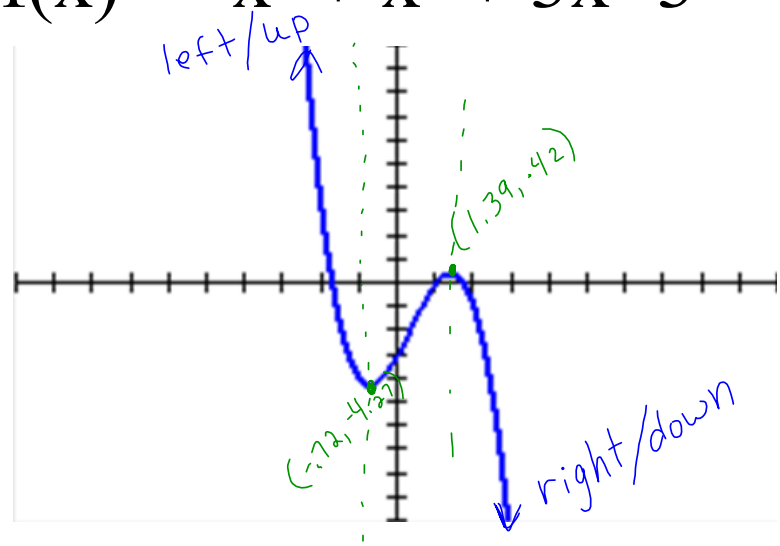
Graph the polynomial and state the interval where it is increasing and decreasing. Describe the end behavior.

$x \to -\infty \; y \to \infty$
$x \to \infty \; y \to -\infty$

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

decrease
$(-\infty, -.72) \cup (1.39, \infty)$

increase
$(-.72, 1.39)$

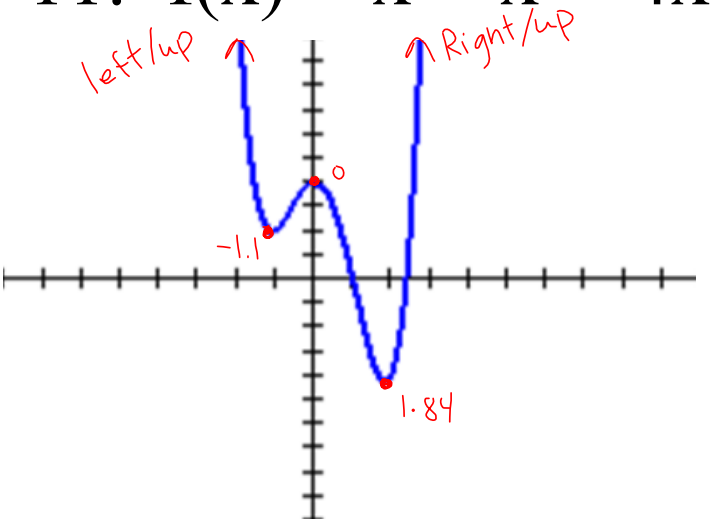


Pull

Graph the polynomial and state the interval where it is increasing and decreasing. Describe the end behavior.

$x \to -\infty \; f(x) \to \infty$
$x \to \infty \; f(x) \to \infty$

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

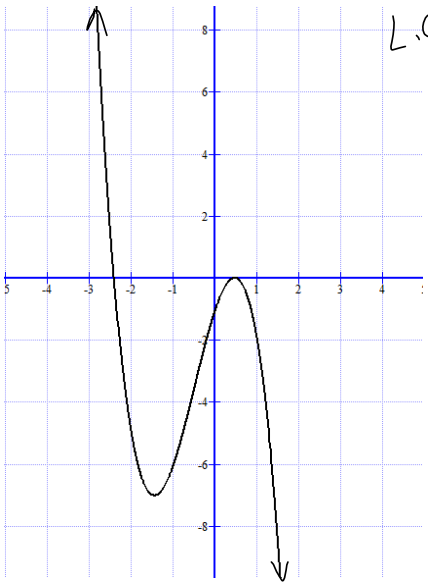
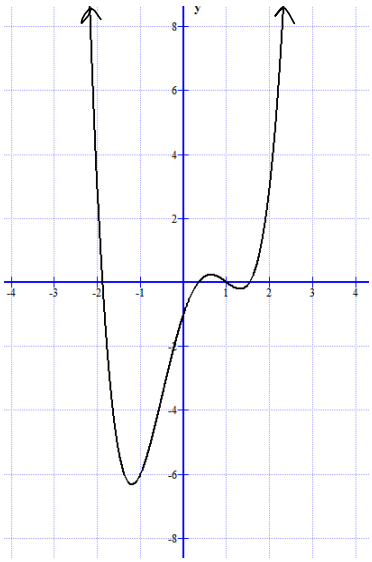


decrease $(-\infty, -1.1) \cup (0, 1.84)$
increase $(-1.1, 0) \cup (1.84, \infty)$

Pull

Describe the degree and leading coefficient of the polynomial function whose graph is shown.

odd degree
L.C. (-)



even degree
L.C. (+)