Alg. II
5-3
Notes
11-20-13

Algebra II - Notes

11-20-13 | 5-3 Polynomial Functions - Notes

<u>No</u> calculator on this target -

* Only polynomials with one variable

1. Given the function $b(m) = 2m^2 + m - 1$

$b(\ ) = 2(\ )^2 + (\ ) - 1$

$b(3) = 2(3)^2 + (3) - 1$

$2(9) + 3 - 1$

$18 + 3 - 1 \rightarrow 21 - 1 \rightarrow 20$

$\boxed{b(3) = 20}$

$b(-3) = 2(-3)^2 + (-3) - 1$

$2(9) - 3 - 1$

$18 - 3 - 1$

$15 - 1$

$\boxed{b(-3) = 14}$

2. Given the function $b(m) = 2m^2 + m - 1$

$b(2x-1) = 2\boxed{(2x-1)^2} + (2x-1) - 1$

Do First

$(2x-1)(2x-1)$

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

$4x^2 - 4x + 1$

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

$8x^2 - 8x + 2 + 2x - 1 - 1$

$\boxed{8x^2 - 6x}$

Note:

$(2x+5)(2x+5)$

$4x^2 + 10x + 10x + 25$

$4x^2 + 20x + 25$ ← perfect square trinomial

DO NOT MAKE THIS MISTAKE

$(2x+5)^2 = (2x)^2 + (5^2) = 4x^2 + 25$ ← <u>WRONG</u>

$3b(x) =$ "3 times the function "b" evaluated at "X""

$\downarrow$

First $b(x)$

Then multiply by 3

$3b(x) = 2x^2 + x - 1$

$$3b(x) = 3(2x^2 + x - 1)$$
$$= 6x^2 + 3x - 3$$

2. Given the function $b(m) = 2m^2 + m - 1$

$$b(2x-1) - (3b(x))$$

$$\downarrow \qquad \downarrow$$

$$8x^2 - 6x - (6x^2 + 3x - 3)$$

$$8x^2 - 6x - 6x^2 - 3x + 3$$

$$\boxed{2x^2 - 9x + 3}$$

(2)

3. Given the function $r(x) = 2x^2 - 5x + 1$

Find $\underbrace{r(a^2)} + \underbrace{r(a+2)}$

$r(a^2) = 2(a^2)^2 - 5(a^2) + 1$

$= \boxed{2a^4 - 5a^2 + 1}$

$r(a+2) = 2(a+2)^2 - 5(a+2) + 1$

$(a+2)(a+2)$

$a^2 + 2a + 2a + 4$

$\downarrow$

$a^2 + 4a + 4$

$2(a^2 + 4a + 4) - 5(a+2) + 1$

$\downarrow$

$2a^2 + 8a + 8 - 5a - 10 + 1$

$\boxed{2a^2 + 3a - 1}$

$r(a^2) + r(a+2)$

$\downarrow$

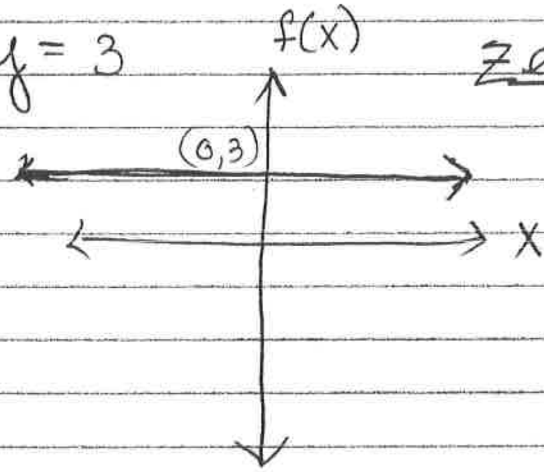
$2a^4 - 5a^2 + 1 + (2a^2 + 3a - 1)$

$2a^4 - 5a^2 + 1 + 2a^2 + 3a - 1 =$

$\downarrow$

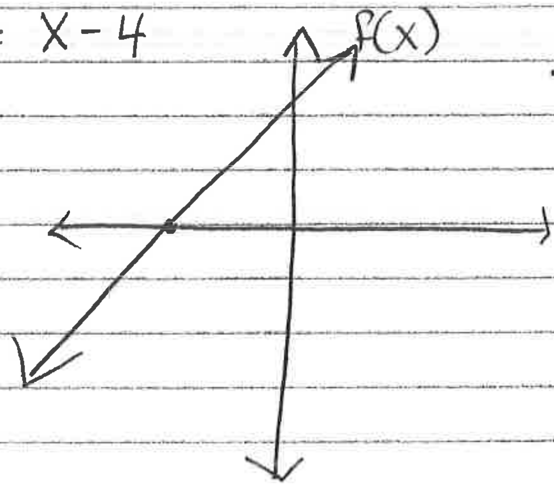
$\boxed{r(a^2) + r(a+2) = 2a^4 - 3a^2 + 3a}$

$y = 3$



Zero degree
(does not touch x-axis)

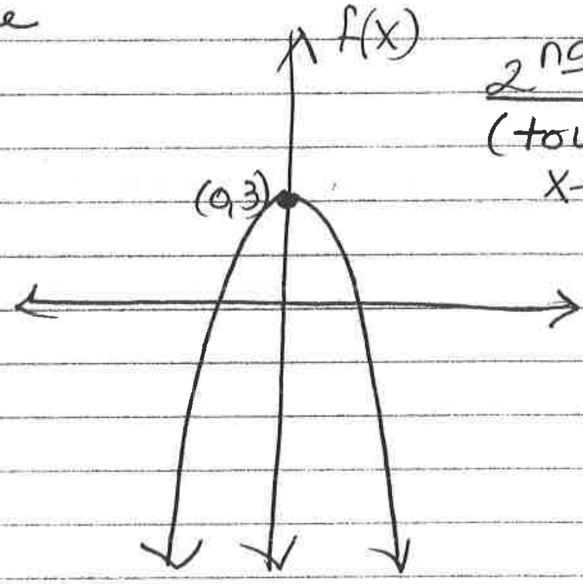
$y = x - 4$



First degree
(touches x-axis once)

degree

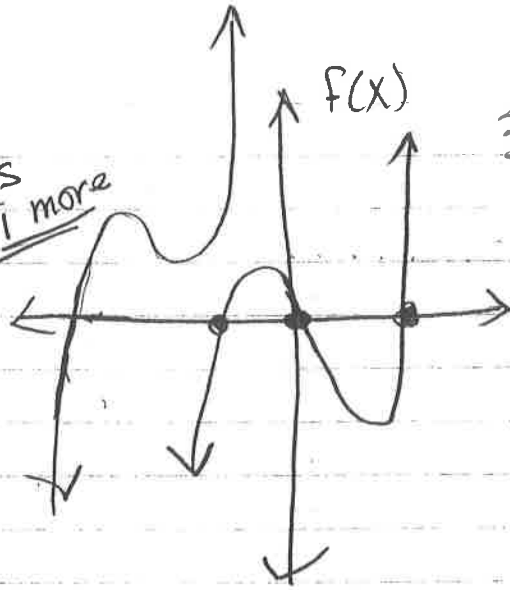
$y = -x^{2} + 3$



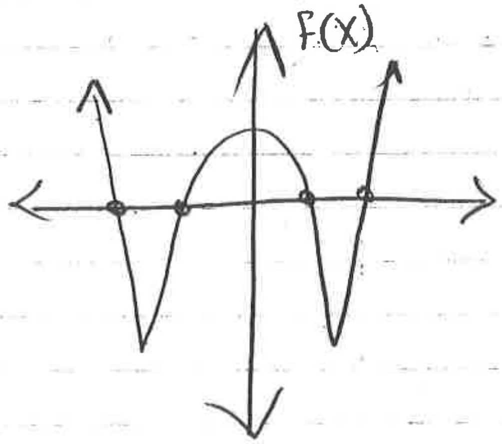
2nd degree
(touches the x-axis twice)

(3)

2 turns
degree is 1 more



3rd degree



4^{th} degree
(3 turns)

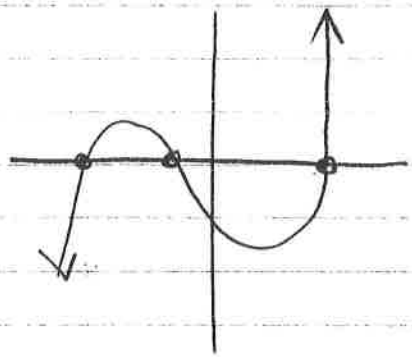
What does degree tell us?

- number of turns
- number of zeros

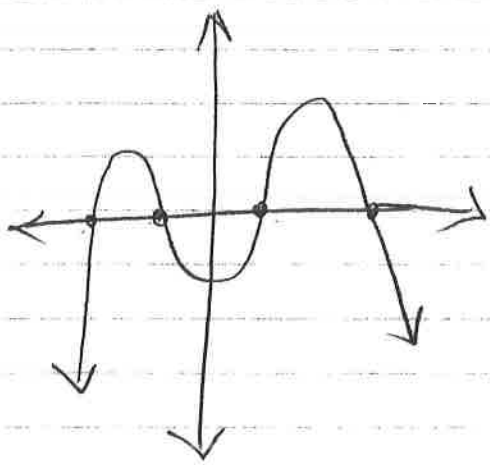
Even degrees - (ex: x^{2}) = arrows go same direction 

odd degrees - (ex: x^{3}) = arrows go opposite direction 

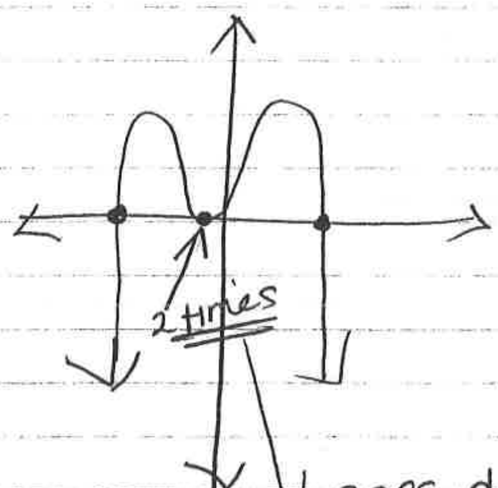
How many zeros does it have?



ODD
3rd degree



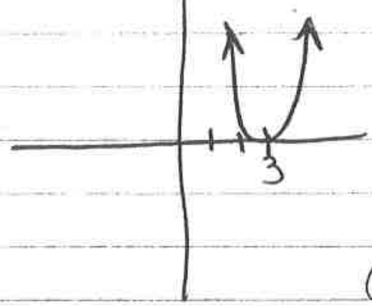
Even
4th degree



Even
4th degree

goes down and up at one point – counts as 2

4

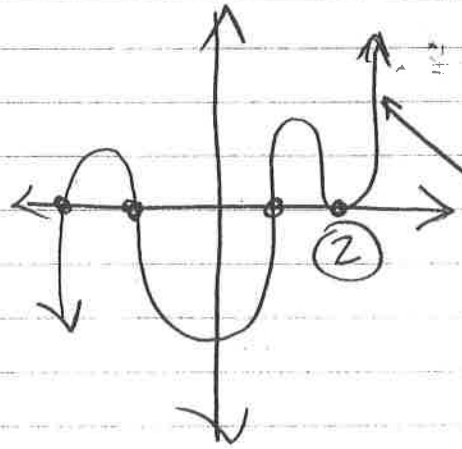


$x = 3$

$-3 \quad -3$

$(x-3)^2 = 0$

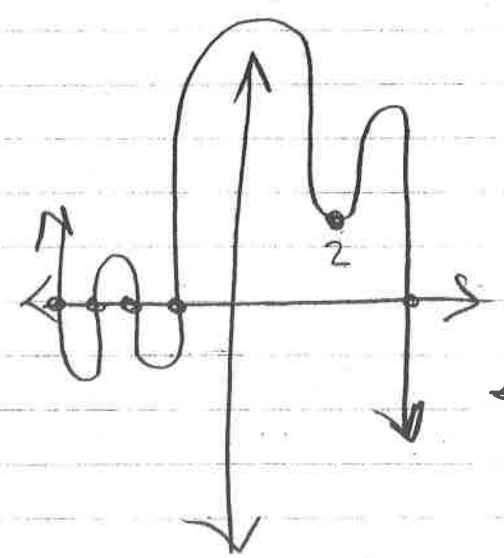
$(x-3)(x-3) = 0$



ODD

5th degree

Positive (up)
(Coefficient is +)



ODD

7 degrees

← negative (down)
(Coefficient is −)

Coefficient next to highest degree —

Positive - right arrow goes up

Negative - right arrow goes down

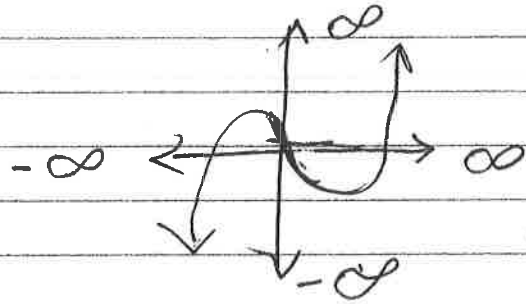
Zeros -

Even degrees - Must have even # of zeros
(arrows - same direction)

Odd degrees - Must have odd # of zeros
(arrows - different directions)

Describing end behavior =

as $x \longrightarrow \infty$, $y \longrightarrow$ ∞



As $x \longrightarrow -\infty$, $y \longrightarrow -\infty$

3rd degree
ODD

$y = 5x^{3} + 2x^2 - 7$ ← ODD - right arm up (arrow)
Left arm down

Positive ← right arm goes up
(arrow)

7th degree ODD

$y = -2x^{7} + 4x^3 + 10$ ← ODD - right arm down
Left arm up

Negative ← right arm goes down
(arrow)