

## QUIZ 3.1 - 3.2

30

1. Determine whether each function is a polynomial function. If it is, give its degree, constant term, leading coefficient and graph its general shape (without being precise at all).

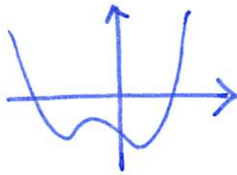
a)  $y = 3x^4 - 5x + 2$

yes

degree: 4

Constant term: 2

LC: 3



b)  $y = 2^x + 4$

no

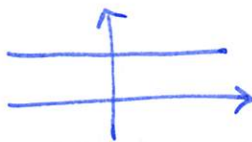
c)  $y = 5$

yes

degree: 0

CT: 5

LC: 5



d)  $y = x^{-2} + 3x - 1$

no

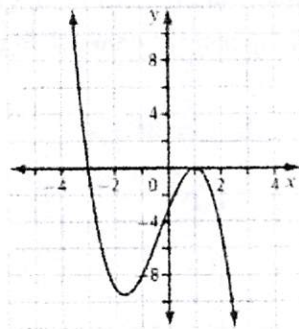
2. Use synthetic division to divide  $x^3 + 3x^2 - 2x + 5$  by  $x + 1$ .

$$\begin{array}{r|rrrr} -1 & 1 & 3 & -2 & 5 \\ + & & -1 & -2 & 4 \\ \hline x & 1 & 2 & -4 & 9 \end{array}$$

$$\frac{x^3 + 3x^2 - 2x + 5}{x + 1} = x^2 + 2x - 4 + \frac{9}{x + 1}$$

3. For each graph of a polynomial function, determine the degree, the sign of the leading coefficient and the number of x-intercepts.

a)

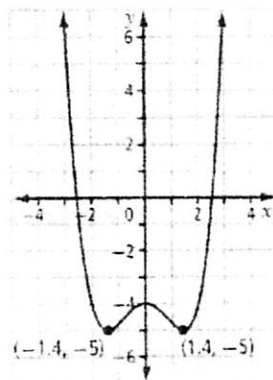


degree : 3

LC : -

# x-int : 2

b)

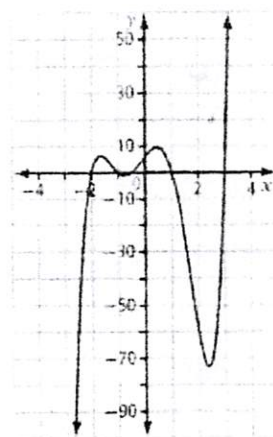


degree : 4

LC : +

# x-int : 2

c)



degree : 5

LC : +

# x-int : 5 (or 4...)

4. a) List all the possible numbers of x-intercepts for a degree 3 polynomial ?

1, 2 or 3.

- b) List all the possible numbers of x-intercepts for a degree 4 polynomial ?

0, 1, 2, 3, or 4.

5. A skateboard manufacturer determines that its profit,  $P$ , in dollars, can be modelled by the function  $P(x) = 1000x + 1.25x^4 - 3200$ , where  $x$  represents the number, in hundreds, of skateboards sold.

a) What are the restrictions on the domain of this function? *in this situation*

$$D = [0; +\infty)$$

$$x \geq 0$$

b) Which window should you use on your calculator to see the general shape of the graph considering the restrictions on the domain...

$$x\text{-min} = 0$$

$$x\text{-max} = 20$$

$$y\text{-min} = -4000$$

$$y\text{-max} = 220000$$

$$-3200$$

$$216800$$

c) What is the y-intercept of the function? How do you find it without graphing the function? What does it represent in this context?

$$y\text{-int}: -3200$$

*(it's the constant term or replace  $x$  by 0)*

*The loss of money if no skateboard is sold.*

d) What do the x-intercepts represent in this context?

*the number of skateboards that have to be sold to break even.*

e) What is the profit from the sale of 1200 skateboards?

$$P = 1000 \times 12 + 1.25 \times 12^4 - 3200$$

$$P = \$34720$$

f) Approximately, how many skateboards does the manufacturer need to sell (~~+~~ ~~50~~) in order to make a \$ 8 000 profit? *Don't show your work.*

$$\approx 742 \text{ skateboards.}$$

6. Divide  $2x^2 - x + 5$  by  $x + 3$  using long division.

$$\begin{array}{r} 2x - 7 \\ x+3 \overline{) 2x^2 - x + 5} \\ \underline{2x^2 + 6x} \phantom{+ 5} \\ -7x + 5 \\ \underline{-7x - 21} \\ 26 \end{array}$$

$$\frac{2x^2 - x + 5}{x + 3} = 2x - 7 + \frac{26}{x + 3}$$

7. Determine the remainder when  $2x^3 + 3x^2 - 17x - 30$  is divided by  $x - 2$ .

$$2 \times (2)^3 + 3(2)^2 - 17(2) - 30 = \underline{\underline{-36}}$$

8. Determine the value of  $k$  if the remainder is  $-2$  for  $(2x^3 - 5x^2 - 4x + k) \div (x + 1)$

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

$$-2 - 5 + 4 + k = -2$$

$$\boxed{k = 1}$$

9. For what value of  $m$  will the polynomial  $P(x) = x^3 + 6x^2 + mx - 4$  have the same remainder when it is divided by  $x - 1$  and  $x + 2$ ?

$$1^3 + 6 \times 1^2 + m \times 1 - 4 = (-2)^3 + 6x(-2)^2 + m(-2) - 4$$

$$m + 3 = -2m + 12$$

$$3m = 9$$

$$\boxed{m = 3}$$

10. Can the following polynomials be factored by  $(x + 2)$ ? If so, do it.

a)  $x^3 - 4x^2 - 7x + 10$

b)  $3x^3 - 5x + 1$

$$(-2)^3 - 4(-2)^2 - 7(-2) + 10 = 0$$

yes!

$$x^3 - 4x^2 - 7x + 10 = (x + 2)(x^2 - 6x + 5)$$

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

$$= -13$$

No!