MHF4U1-ASSIGNMENT CHAPTER 2 **NAME:____________________________**

K: /60 I: /28 C: /16 A: /8

Multiple Choice [K: 32 marks]
Identify the choice that best completes the statement or answers the question.

c 1. If $x^3 - 4x^2 + 5x - 6$ is divided by $x - 1$, then the restriction on x is
- a. $x \neq -4$
- b. $x \neq -1$
- c. $x \neq 1$
- d. no restrictions

$x - 1 \neq 0$ so $x \neq 1$

c 2. What is the remainder when $x^4 + 2x^2 - 3x + 7$ is divided by $x + 2$?
- a. 25
- b. 13
- c. 37
- d. 9

$x^4 + 0x^3 + 2x^2 - 3x + 7$

Method 1 — For Method 2 refer to #4

$$\begin{array}{r} x^3 - 2x^2 + 6x - 15 \; R\,37 \\ x+2 \enclose{longdiv}{x^4 + 0x^3 + 2x^2 - 3x + 7} \\ -\;\underline{x^4 + 2x^3} \\ -2x^3 + 2x^2 \\ -\;\underline{-2x^3 - 4x^2} \\ 6x^2 - 3x \\ -\;\underline{6x^2 + 12x} \\ -15x + 7 \\ -\;\underline{-15x - 30} \\ 37 \end{array}$$

d 3. If $6x^4 - 2x^3 - 21x^2 + 7x + 8$ is divided by $3x - 1$ to give a quotient of $2x^3 - 7x$ and a remainder of 8, then which of the following is true?
- a. $\dfrac{6x^4 - 2x^3 - 21x^2 + 7x + 8}{3x - 1} = 2x^3 - 7x + \dfrac{8}{3x - 1}$
- b. $6x^4 - 2x^3 - 21x^2 + 7x + 8 = (3x - 1)(2x^3 - 7x) + 8$
- c. $x \neq \dfrac{1}{3}$
- d. all of the above

d 4. When $P(x) = 4x^3 - 4x + 1$ is divided by $2x - 3$, the remainder is
- a. $2x^2 + 3x + \dfrac{5}{2}$
- b. $P(3) = 97$
- c. $P\left(-\dfrac{3}{2}\right) = -\dfrac{13}{2}$
- d. $P\left(\dfrac{3}{2}\right) = \dfrac{17}{2}$

$a = 2$ $b = 3$

$4x^3 + 0x^2 - 4x + 1$

method 2

$P\left(\frac{b}{a}\right) = P\left(\frac{3}{2}\right) = 4\left(\frac{3}{2}\right)^3 - 4\left(\frac{3}{2}\right) + 1$

$= 4\left(\frac{27}{8}\right) - 6 + 1$

$= \frac{27}{2} - 6 + 1$

$= \frac{17}{2}$

c 5. For a polynomial $P(x)$, if $P\left(-\dfrac{3}{5}\right) = 0$, then which of the following must be a factor of $P(x)$?
- a. $x - \dfrac{3}{5}$
- b. $3x + 5$
- c. $5x + 3$
- d. $5x - 3$

$P\left(\frac{b}{a}\right)$

so $b = -3$ $a = 5$

so... $ax - b = 5x + 3$

a 6. Which of the following binomials is a factor of $x^3 - 6x^2 + 11x - 6$?
- a. $x - 1$ $a = 1, b = 1$
- b. $x + 1$ $a = 1, b = -1$
- c. $x + 7$ $a = 1, b = -7$
- d. $2x + 3$ $a = 2, b = -3$

Play out all 4 scenarios to see which $P\left(\frac{b}{a}\right) = 0$

b 7. Which set of values for x should be tested to determine the possible zeros of $x^3 - 2x^2 + 3x - 12$?
- a. 1, 2, 3, 4, 6, and 12
- b. ±1, ±2, ±3, ±4, ±6, and ±12
- c. ±1, ±2, ±3, ±4, and ±6
- d. ±2, ±3, ±4, ±6, and ±12

c 8. Which of the following is the fully factored form of $x^3 - 6x^2 - 6x - 7$?
- a. $(x - 7)(x + 1)^2$
- b. $(x - 7)(x + 1)(x - 1)$ ← Expand each
- c. $(x - 7)(x^2 + x + 1)$
- d. ~~$(x - 6)(x + 1)(x - 1)$~~

c 9. Which of the following is the factored form of $x^4 - 2x^2 - 3$? → −1, 3 or −1, −3

a. $(x-1)(x+1)(x-3)$ c. $(x^2+1)(x^2-3)$

b. $(x^2-1)(x+3)$ d. $(x+1)(x-1)(x+3)(x-3)$

c 10. One root of the equation $x^3 + 2x - 3x^2 - 6 = 0$ is

Test each $P(\frac{b}{a})$ to find it $= 0$.

a. $-3 \to (x+3)$ so $P(-\frac{3}{1})$ c. $3 \to (x-3)$ so $P(\frac{3}{1})$

b. $-1 \to (x+1)$ so $P(-1)$ d. $1 \to (x-1)$ so $P(1)$

b 11. What is the maximum number of real distinct roots that a quartic equation can have? — degree 4

a. infinitely many c. 2

b. 4 d. none of the above

b 12. Determine the value of k so that $x - 3$ is a factor of $x^3 - 3x^2 + x + k$. $P(\frac{3}{1}) = 0 = (3)^3 - 3(3)^2 + (3) + k$

$x-3$, $a=1$ $b=3$ $0 = 27 - 27 + 3 + k$

$k = -3$

a. $k=3$ c. $k=1$

b. $k=-3$ d. $k=-1$

b 13. Which of the following is the fully factored form of $x^3 + 3x^2 - x - 3$?

Expand each →

a. $(x+3)(x^2-1) = x^3 + 3x^2 - x - 3$ BUT... c. $x^2(x+3) - (x+3)$

b. $(x-1)(x+1)(x+3)$ (x^2-1) factors further to $(x+1)(x-1)$ d. $(x^2-1)(x-3)$

b 14. If 2 is one root of the equation $4x^3 + kx - 24 = 0$, then the value of k is $P(\frac{2}{1}) = 0 = 4(2)^3 + k(2) - 24$

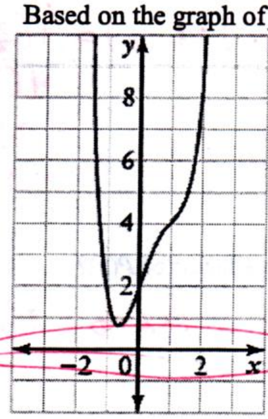
$0 = 4(8) + 2k - 24$

$k = -4$

a. −1 $(x-2)$ so $a=1, b=2$ c. 8

b. −4 $P(\frac{2}{1}) = 0$ d. impossible to determine

d 20. Based on the graph of $f(x) = x^4 - 2x^3 + 3x + 2$ shown, what are the real roots of $x^4 - 2x^3 + 3x + 2 = 0$?



no real roots

a. 2 c. impossible to determine

b. −2, −1, 1, 2 d. no real roots

a 16. A family of quadratic functions has zeros −3 and 5. Which of the following is a member of this family? — degree 2

a. $y = -\frac{1}{2}(x+3)(x-5)$ c. $y = 4(x+3)(x-5)(x+15)$

b. $y = 2(x+3)^2(x-5)$ d. $y = (x+5)(x-3)$

a 13. Find k if $2x + 1$ is a factor of $kx^3 + 7x^2 + kx - 3$.

$2x+1$

$a=2,\ b=-1$

a. $k = -2$

b. $k = 2$

c. $k = \dfrac{11}{5}$

d. $k = 4/5$

$P(-\tfrac{1}{2}) = 0 = k(-\tfrac{1}{2})^3 + 7(-\tfrac{1}{2})^2 + k(-\tfrac{1}{2}) - 3$

$= k(-\tfrac{1}{8}) + 7(\tfrac{1}{4}) + k(-\tfrac{1}{2}) - 3$

$= k(-\tfrac{1}{8}) + k(\tfrac{-1}{2}) + \tfrac{7}{4} - 3$

$0 = k(-\tfrac{1}{8} - \tfrac{1}{2}) - \tfrac{5}{4}$

$\tfrac{5}{4} = k(-\tfrac{5}{8})$

$\tfrac{5}{4} \times (-\tfrac{8}{5}) = k$

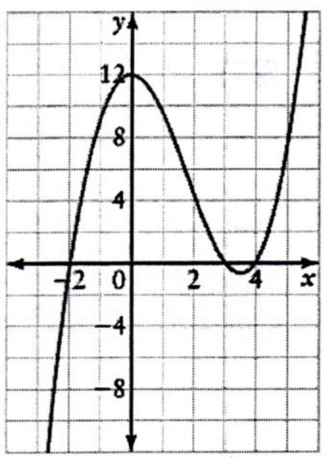
$k = -2$

ii	i
iii	iv

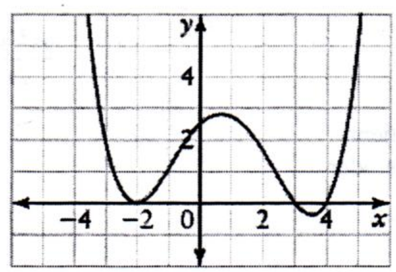
x^3 rules out c and d

a 18. Which of the following graphs of polynomial functions corresponds to a cubic polynomial equation with roots -2, 3, and 4?

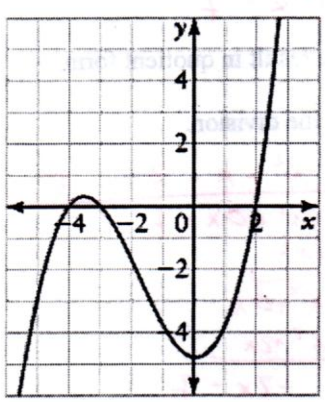
a.



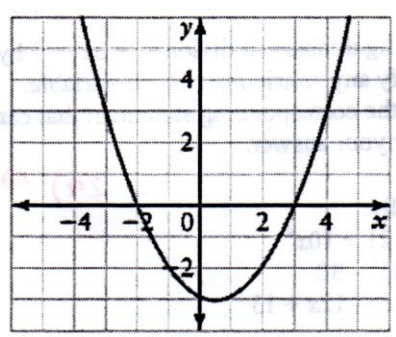
c.



b.



d.



c 19. Which of the following represents a family of cubic polynomials with zeros -4, 2, and 6?

a. $y = (x+4)(x-2)(x-6)$

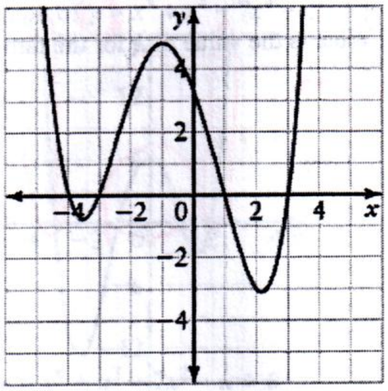
b. $y = (x-4)(x+2)(x+6)$

c. $y = k(x+4)(x-2)(x-6)$

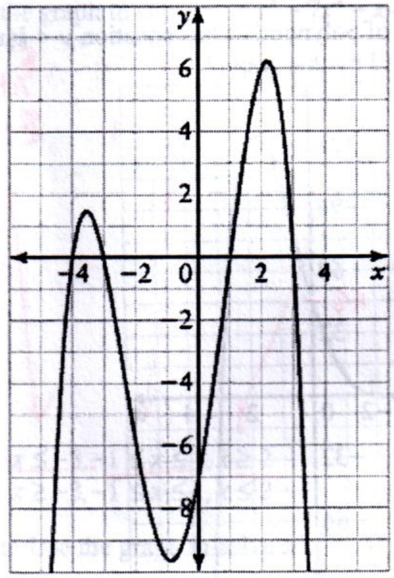
d. $y = k(x-4)(x+2)(x+6)$

d 20. Examine the graphs of the following polynomial functions. Which graph does not belong to the same family?

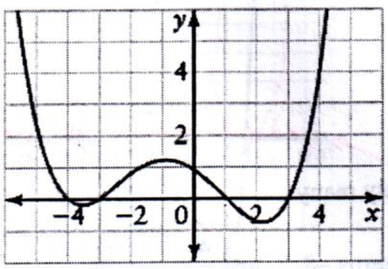
a.



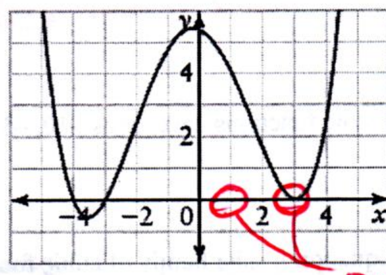
c.



b.



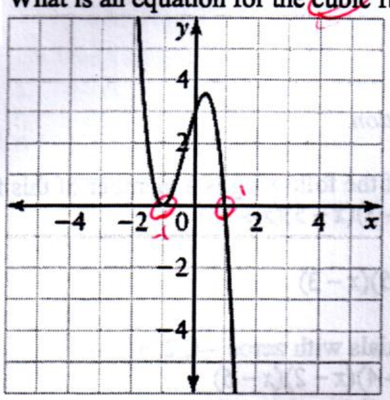
d.



Different x-intercepts

d 21. What is an equation for the cubic function represented by this graph?

degree 3



- x-intercepts are -1, 1
- and at x = -1 has order 2 because it doesn't cross axis.
- also Quadrant II to IV means negative leading

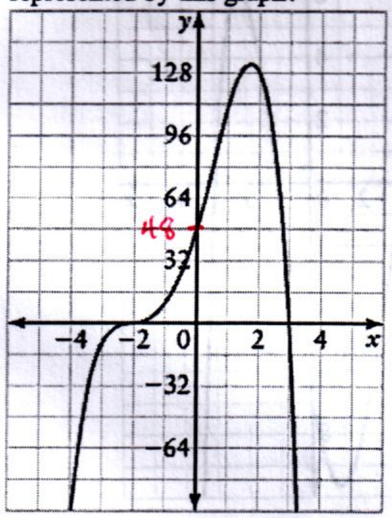
a. $y = 3(x-1)^2(x+1)$

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

c. $y = -3(x-1)^2(x+1)$

d. $y = -3(x+1)^2(x-1)$

d 22. A family of polynomials has equation $y = k(x-3)(x+2)^3$. What is the value of k for the family member represented by this graph?



at $x=0$, $y=48$

Plug it into your equation

$48 = k(0-3)(0+2)^3$

$48 = k(-3)(2)^3$

$48 = k(-3)(8)$

$48 = k(-24)$

$k = -2$

a. $k = 48$
b. $k = -48$
c. $k = 2$
d. $k = -2$

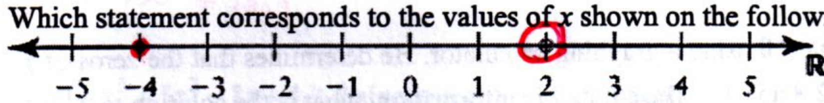
d 23. How many cubic functions have zeros −10, −5, and 4? → you can make k-value anything

a. 1
b. 2
c. 3
d. infinitely many

c 24. What is an equation for the family of cubic functions with zeros −8, 3, and $\frac{4}{3}$?

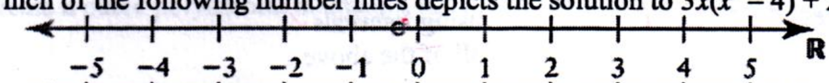
a. $y = (x+8)(x-3)(4x-3)$
b. $y = (x+8)(x-3)(3x-4)$
c. $y = k(x+8)(x-3)(3x-4)$
d. $y = k(x+8)(x-3)(4x-3)$

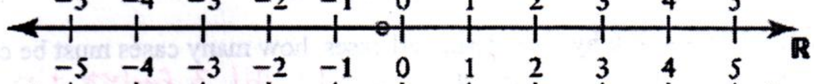
d 25. Which statement corresponds to the values of x shown on the following number line?

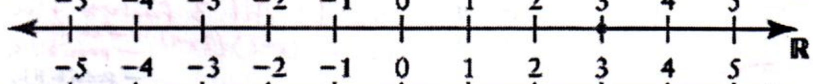


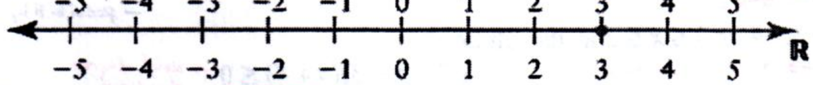
a. ~~$-4 \le x < 2$~~
b. ~~$-4 < x \le 2$~~
c. ~~$-4 \le x > 2$~~
d. $-4 \ge x > 2$

a 26. Which of the following number lines depicts the solution to $3x(x^2-4) + 2x > 3x^3 + 5(x+1)$?

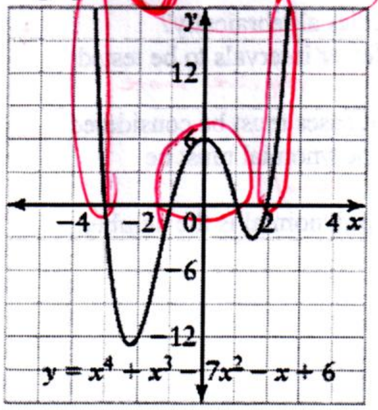
a.


b.


c.


d.


c 27. A graph of $y = x^4 + x^3 - 7x^2 - x + 6$ is shown. Use the graph to solve $x^4 + x^3 - 7x^2 - x + 6 \geq 0$.



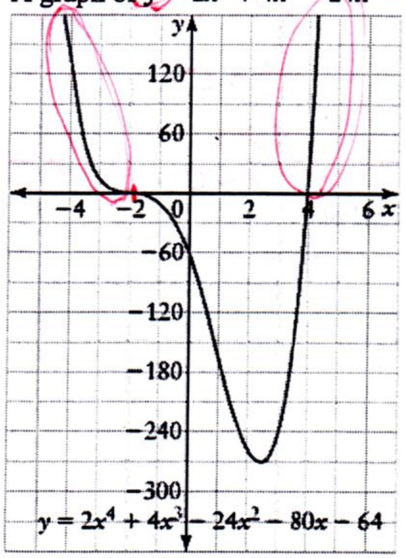
$-\infty$ to -3, -1 to 1, 2 to ∞

or

$x \leq -3$, $-1 \leq x \leq 1$, $x \geq 2$

a. $-1 \leq x \leq 1$
b. $-3 \leq x \leq -1, 1 \leq x \leq 2$
c. $x \leq -3, -1 \leq x \leq 1, x \geq 2$
d. $x \geq -3, -1 \leq x \leq 1, x \leq 2$

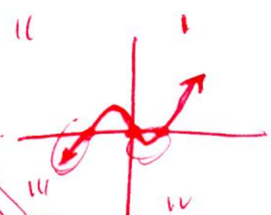
b 28. A graph of $y = 2x^4 + 4x^3 - 24x^2 - 80x - 64$ is shown. Use the graph to solve $-2x^4 - 4x^3 + 24x^2 + 80x + 64 \geq 0$.



$x \leq -2$ and $x \geq 4$

a. $x = -2, 4$
b. $x \leq -2, x \geq 4$
c. $-2 \leq x \geq 4$
d. $-2 \leq x \leq 4$

Degree: 3
positive leading coefficient so...
QIII to QI



b 29. Toby is solving $x^3 + x^2 - 5x < 0$ using a graphing calculator. He determines that the zeros of $y = x^3 + x^2 - 5x$ are 0 and approximately -2.8 and 1.8. Based on this information, what is the solution to $x^3 + x^2 - 5x < 0$?

a. $x = 0, x = -2.8, x = 1.8$
b. $x < -2.8, 0 < x < 1.8$
c. $-2.8 < x < 0, x > 1.8$
d. $-2.8 < x < 1.8$

$y < 0$ when
$x < -2.8$
and $0 < x < 1.8$

d 30. The inequality $x^4 - 5x^2 + 4 \geq 0$ can be solved by

a. considering all cases ✓ $\pm 1, \pm 2, \pm 4$
b. graphing ✓
c. using intervals ✓
d. all of the above

c 31. When solving $3(x-2)(2x-1)(x+4) \geq 0$ by considering all cases, how many cases must be considered?

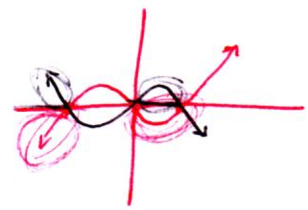
$x=2$ $x=\frac{1}{2}$ $x=-4$

a. 2
b. 3
c. 4
d. 8

Case 1: x ≤ -4
Case 2: -4 ≤ x ≤ 0.5
Case 3: 0.5 ≤ x ≤ 2
Case 4: x ≥ 2

d 32. Which inequality has $x \leq -4$ or $0 \leq x \leq 3$ as its solution?

a. $x(x-3)(x+4) \leq 0$ → odd degree, +ve L.C.
b. $-2x(x-3)(x+4) \geq 0$ → odd degree, −ve L.C.
c. $100x(x-3)(x+4) \leq 0$ → odd degree +ve L.C.
d. all of the above



Notice that choices a, b, and c are all part of the same family since they all have the same 3 x-intercepts. You can draw a table to demonstrate all 4 cases to consider in the inequality to solve this question.

(If you don't know how, please ask Mr. Choi)

Short Answer

33. Find the solution(s) for x in $x(4x-3)(x+1) = 0$ [I: 3 marks]

34. Find the solution(s) to $x^2(x^2+1) > 0$ [I: 3 marks]

35. **a)** Use long division to divide $x^3 + 3x^2 - 7$ by $x + 2$. Express the result in quotient form. [K: 3 marks]
b) Identify any restrictions on the variable. [K: 1 mark]
c) Write the corresponding statement that can be used to check the division. [K: 1 mark]
d) Using what you wrote for part c), verify your answer. [K: 2 marks]

40. Solve the following inequalities using an **algebraic method**.

a) $x^2 + x - 2 > 0$ [I: 1 mark] [K: 3 marks]

b) $x(x-2)(x-1)(x+1) \leq 0$ [K: 5 marks]

c) $x^3 \geq 9x$ [I: 1 mark] [K:3 marks]

d) $-x^3 + 2x^2 + 4x - 8 \geq 0$ [I: 2 marks] [K: 4 marks]

33. Find the solution(s) for x in $x(4x-3)(x+1)=0$ [I: 3 marks]

$x(4x-3)(x+1)=0$

Set each factor to zero

Then solve for each x

$x = 0$ $x = 0$

$(4x-3)=0$ $x = 3/4$

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

34. Find the solution(s) to $x^2(x^2+1)>0$ [I: 3 marks]

Look at each factor in the equation

x^2 and (x^2+1)

No matter what value you choose for x both factors stay positive

For $x^2 > 0$ x simply must not equal 0

so . . . $\{x \mid x \in \mathbb{R}, x \neq 0\}$

35) a)

$$\begin{array}{r}
x^2 + x - 2 \quad R\ \frac{-3}{x+2} \\
x+2 \overline{)\, x^3 + 3x^2 + 0x - 7} \\
-\ x^3 + 2x^2 \\
\hline
x^2 + 0x \\
-\ x^2 + 2x \\
\hline
-2x - 7 \\
-\ -2x - 4 \\
\hline
-3
\end{array}$$

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

b) $x \neq -2$

same

c) $\frac{x^3+3x^2-7}{x+2} = x^2+x-2+\frac{-3}{x+2}$

d) $x^3+3x^2-7 = (x+2)\left(x^2+x-2-\frac{3}{x+2}\right)$

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

$= x^3 + 2x^2 + x^2 \cancel{+2x} \cancel{-2x} - 4 - 3$

$= x^3 + 3x^2 - 7$

40)

a)

$$x^2 + x - 2 > 0$$

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

x-intercepts: $x = -2$ $\quad x = 1$

$x = -3$	$x = 0$	$x = 2$
$y = (-3+2)(-3-1)$	$y = (0+2)(0-1)$	$y = (2+2)(2-1)$
$= (-1)(-4)$	$= (2)(-1)$	$= (4)(1)$
$= +4$	$= -2$	$= +4$
so $y > 0$	so $y < 0$	so $y > 0$

Boundaries between the columns: $x = -2$, $x = 1$

$\therefore$ $(x+2)(x-1) > 0$ when $x < -2$ and $x > 1$

b)

$$x(x-2)(x-1)(x+1) \leq 0$$

$x = 0 \quad x = 2 \quad x = 1 \quad x = -1$

$x = -2$	$x = -0.5$	$x = 0.5$	1.5	$x = 3$
$y = (-2)(-2-2)(-2-1)(-2+1)$	$y = (-0.5)(-2.5)(-1.5)(+0.5)$	$y = 0.5(-1.5)(-0.5)(1.5)$	$y = 1.5(-0.5)(0.5)(1.5)$	$y = 3(1)(2)(4)$
$= (-2)(-4)(-3)(-1)$	$= -0.9375$	$= +0.5625$	$= -0.5625$	$= 24$
$= +24$				
~~$y > 0$~~	$y < 0$	~~$y > 0$~~	$y < 0$	~~$y > 0$~~

Boundaries between the columns: $x = -1$, $x = 0$, $x = 1$, $x = 2$

so $x(x-2)(x-1)(x+1) \leq 0$

when $-1 \leq x \leq 0, \ 1 \leq x \leq 2$

c) $x^3 \geq 9x$

$x^3 - 9x \geq 0$

$x(x^2 - 9) \geq 0$

$x(x+3)(x-3) \geq 0$

$x=0 \quad x=-3 \quad x=3$

	$x=-3$		$x=0$		$x=3$	
-4		-1		1		4
$\cancel{y=(-4)(-4+3)(-4-3)}$		$y=(-1)(-1+3)(-1-3)$		$y=(1)(1+3)(1-3)$		$y=4(4+3)(4-3)$
$\cancel{=(-4)(-1)(-7)}$		$=(-1)(2)(-4)$		$=(1)(4)(-2)$		$=4(7)(1)$
$\cancel{=-28}$		$=+8$		$=-8$		$=28$
$\cancel{y<0}$		$y>0$		$y<0$		$y>0$

so $x(x+3)(x-3) \geq 0$ when

$-3 \leq x \leq 0$ and when $x \geq 3$

d) $-x^3 + 2x^2 + 4x - 8 \geq 0$

$-(x^3 - 2x^2 - 4x + 8) \geq 0$

$-(x^2(x-2) - 4(x-2)) \geq 0$

$-(x-2)(x^2-4) \geq 0$

$-(x-2)(x+2)(x-2) \geq 0$

$-(x+2)(x-2)^2 \geq 0$

$x=-2 \quad x=2$

	$x=-2$		$x=2$	
-3		0		3
$y=-(-3+2)(-3-2)^2$		$y=-(0+2)(0-2)^2$		$y=-(3+2)(3-2)^2$
$=-(-1)(-5)^2$		$=-(2)(-2)^2$		$=-(5)(1)^2$
$=+25$		$=-8$		$=-5$
$y>0$		$y<0$		$y<0$

so $-(x+2)(x-2)^2 \geq 0$

when $x \leq -2$

41) $P(x) = 6x^3 + mx^2 + nx - 5$

$(x+1)$ is a factor

so $\frac{b}{a} = -1$

$(x-1)$ has a remainder of -4, so $\frac{b}{a} = 1$

$P(-1) = 6(-1)^3 + m(-1)^2 + n(-1) - 5$

$0 = 6(-1) + m(+1) - n - 5$

$0 = -6 + m - n - 5$

$0 = -11 + m - n$

$m = n + 11$

$P(1) = 6(1)^3 + m(1)^2 + n(1) - 5$

$-4 = 6 + m + n - 5$

$-4 = 1 + m + n$

$0 = 1 + 4 + m + n$

$0 = 5 + m + n$

$m = -n - 5$

Make them equal

$n + 11 = -n - 5$

$2n = -5 - 11$

$2n = -16$

$n = -8$

$\therefore$

$m = -(-8) - 5$

$m = 8 - 5$

$m = 3$

so $m = 3,\ n = -8$

42) $x + t$ so $\frac{b}{a} = -t$

$P(-t) = (-t+t)^4 + (-t+c)^4 - (t-c)^4$

$= \cancel{(0)^4} + (-t+c)^4 - (t-c)^4$

$= ((-1)(t-c))^4 - (t-c)^4$

$= (-1)^4(t-c)^4 - (t-c)^4$

$= (+1)(t-c)^4 - (t-c)^4$

$= 0$

43) -2 is a root of $x^3+x=-4x^2+6$

so $x+2$ is a factor

$$x^3+x+4x^2-6=0$$

$$x^3+4x^2+x-6=0$$

$$
\begin{array}{r|l}
 & x^2+2x-3 \\
\hline
x+2 & x^3+4x^2+x-6 \\
 & -\ (x^3+2x^2) \\
\hline
 & \quad 2x^2+x \\
 & \quad -\ (2x^2+4x) \\
\hline
 & \qquad -3x-6 \\
 & \qquad -\ (-3x-6) \\
\hline
 & \qquad\quad 0
\end{array}
$$

Thus $x^3+4x^2+x-6 = (x+2)(x^2+2x-3)$

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

so we have $x=-2$, $x=-3$, and $x=1$

as our roots.

44) $V = l \times w \times h$

$= l \times l \times h$

$= l \times l(l+4)$

but we have a square base so $l = w$

We also know height is 4cm more than the l.

We also know $V = 225\text{cm}^3$

$225 = l^2(l+4)$

$225 = l^3 + 4l^2$

$0 = l^3 + 4l^2 - 225$

Test factors of 225

$\frac{b}{a} = \pm 1, \pm 5, \pm 9, \pm 15, \pm 25, \pm 45, \pm 225$

$P(5) = 5^3 + 4(5)^2 - 225$

$= 125 + 100 - 225$

$= 0$ $\therefore (x-5)$ is a factor

~~Thus~~ This means $l = 5$ and $h = 5+4 = 9$

$\therefore$ The dimensions are 5cm by 5cm by 9cm.

45) $V = l \times w \times h$

$= 1 \times 2 \times 4 = 8$

Amit needs to increase each dimension by x amount, so that the volume is 9x the original

so

$$9 \times 8 = (x+1)(x+2)(x+4)$$

$$72 = (x^2 + x + 2x + 2)(x+4)$$

$$72 = (x^2 + 3x + 2)(x+4)$$

$$72 = x^3 + 4x^2 + 3x^2 + 12x + 2x + 8$$

$$0 = x^3 + 7x^2 + 14x + 8 - 72$$

$$0 = x^3 + 7x^2 + 14x - 64$$

Factors of 64

for $\frac{b}{a} = \pm 1, \pm 2, \pm 4, \pm 8, \pm 16, \pm 32, \pm 64$

$$P(2) = 2^3 + 7(2)^2 + 14(2) - 64$$

$$= 8 + 28 + 28 - 64$$

$$= 0$$

$\therefore$ $x = 2$ is a solution.

$\therefore$ Amit should increase his dimensions by 2m.

46) $-x^3+5x^2-8x+4 \geq 0$

$-(x^3-5x^2+8x-4) \geq 0$

Possible factors for $\frac{b}{a} = \pm 1, \pm 2, \pm 4$

$P(1) = -((1)^3-5(1)^2+8(1)-4)$

$= -(1-5+8-4)$

$= 0$

$\therefore$ $x=1$ is a solution and $(x-1)$ is a factor

$$\begin{array}{r|l} & x^2-4x+4 \\ \hline x-1 & x^3-5x^2+8x-4 \\ & -\underline{(x^3-x^2)} \\ & -4x^2+8x \\ & -\underline{(-4x^2+4x)} \\ & 4x-4 \\ & \underline{4x-4} \\ & 0 \end{array}$$

so $-(x^3-5x^2+8x-4) \geq 0$

becomes $-(x-1)(x^2-4x+4) \geq 0$

$-(x-1)(x-2)^2 \geq 0$

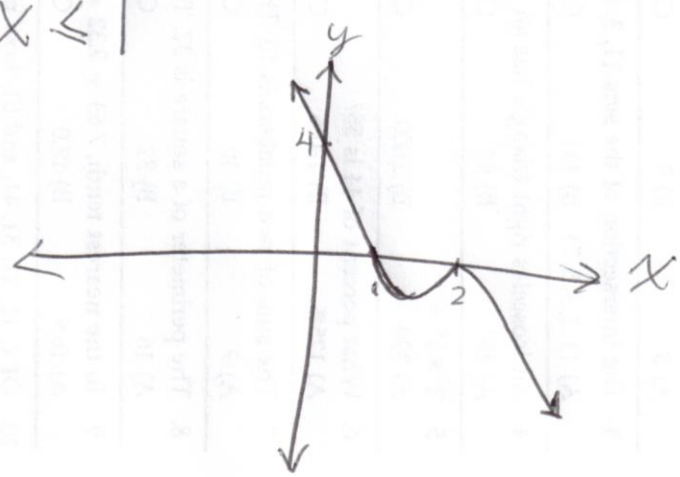
$x=1$ $\quad x=2$

when $x \leq 1$

$x=0$	$x=1$ / $x=1.5$	$x=2$ / $x=2.5$
$y=-(0-1)(0-2)^2$	$y=-(1.5-1)(1.5-2)^2$	$y=-(2.5-1)(2.5-2)^2$
$=-(-1)(-2)^2$	$=-(0.5)(-0.5)^2$	$=-(1.5)(0.5)^2$
$=+4$	$=-0.125$	$=-0.375$
$y>0$	$y<0$	$y<0$

$x_{int} = 1, 2$

$y_{int} = +4$



47) $3x^2(x^2-8)+6x+5 < 4x^4-6x(4x-1)+4$

$$3x^4-24x^2+6x+5 < 4x^4-24x^2+6x+4$$

$$3x^4-4x^4\cancel{-24x^2}\cancel{+24x^2}\cancel{+6x}\cancel{-6x}+5-4<0$$

$$-x^4+1<0$$

$$-(x^4-1)<0$$

$$-(x^2+1)(x^2-1)<0$$

$$-(x^2+1)(x+1)(x-1)<0$$

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

$x=-1$		$x=1$
-2	0	2
~~$y=-((-2)^2+1)$~~		
$y=-((-2)^2+1)(-2+1)(-2-1)$	$y=-(0^2+1)(0+1)(0-1)$	$y=-(2^2+1)(2+1)(2-1)$
$=-(4+1)(-1)(-3)$	$=-(1)(1)(-1)$	$=-(4+1)(3)(1)$
$=-(5)(3)$	$=1$	$=-(5)(3)(1)$
$=-15$	$y>0$	$=-15$
$y<0$		$y<0$