HOMEWORK 5-2 (part 2) SOLUTIONS

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

$x=0$ Multiplicity 1 ; $x=3$ multiplicity 2

b) $2x^3 + x^2 - x$

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

$x^2 + x - 2$ (split)

$(x+\frac{2}{2})(x-\frac{1}{2})$

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

0, -1, $1/2$ All multiplicities are 1

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

Graph on calculator then find min and/or MAX

REL. MIN $y = -1.378$

REL. MAX $y = -3.189$

b) $f(x) = -x^3 - 7x^2 + 7x + 15$

REL. MIN $y = -70.12$

REL. MAX $y = 16.64$

3) $V = L \cdot w \cdot h$

$V = (2x+3)(2x-3) \cdot 3x$

diff. of squares! $((2x)^2 - 3^2) \cdot 3x$

$(4x^2 - 9) \cdot 3x$

$V = \boxed{12x^3 - 27x}$

Homework 5-3 Solutions

1) Solve by factoring

a) $x^3 - 64 = 0$

$(x-4)(x^2+4x+16) = 0$

$\boxed{x=4}$ or

QUADRATIC FORMULA

$$\frac{-4 \pm \sqrt{4^2 - 4 \cdot 1 \cdot 16}}{2 \cdot 1}$$

$$\frac{-4 \pm \sqrt{16-64}}{2}$$

$$\frac{-4 \pm \sqrt{48}}{2}$$

$$\frac{-4 \pm 4\sqrt{3}i}{2}$$

$$\boxed{-2 \pm 2\sqrt{3}i}$$

b) $2x^3 + 8x^2 + 4x = -16$

$2x^3 + 8x^2 + 4x + 16 = 0$

$2x^2(x+4) + 4(x+4) = 0$

$(2x^2+4)(x+4) = 0$

$2x^2 + 4 = 0$ or $\boxed{x = -4}$

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

$\sqrt{x^2} = \sqrt{-2}$

$\boxed{x = \pm\sqrt{2}i}$

c) $2x^3 + 2x^2 - 4x = 0$

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

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

$\boxed{x=0 \quad x=-2 \quad x=1}$

d) $x^4 - 2x^2 - 8 = 0$

SUBSTITUTE $s = x^2$ so that it can look like a quadratic function

$s^2 - 2s - 8 = 0$

$(s-4)(s+2) = 0$

$(x^2-4)(x^2+2) = 0$

$\boxed{x = \pm 2 \quad x = \pm\sqrt{2}i}$

4) $\underbrace{4x^3}_{y_1} = \underbrace{4x^2+3x}_{y_2}$

Find intersection points

OR

set everything to equal 0

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

and find ROOTS

$X=-0.5$ and $X=0$

3) twins $X-2$

sister X

they were born after their sister so they are younger!

SUM of ages +4558

$(X-2)(X-2)\cdot X = (X-2)+(X-2)+X+4558$

twin1 twin2 sister

$(x^2-4x+4)\cdot X = 3x+4554$

$x^3-4x^2+4x = 3x+4554$

$x^3-4x^2+x-4554=0$

USE CALCULATOR to find ROOTS

$X=18$

The twins are $X-2$ or 16 years old.