TY Hons Maths – Homework No.6

Name of Student: _____ **For** _____

1. Factorise the following:

(i) $25x^2-16y^2$ (ii) $a^3-a^2b-ab^2+b^3$ (iii) x^4-x (iv) $3x^2-16x+5$

(i) $25x^2-16y^2$

$=(5x)^2-(4y)^2$

$=(5x+4y)(5x-4y)$

(ii) $a^3-a^2b-ab^2+b^3$

$a^2(a-b)-b^2(a-b)$

$(a^2-b^2)(a-b)$

$(a-b)(a+b)(a-b)$

(iii) x^4-x

$=x(x^3-1)$

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

$a^3-b^3=(a-b)(a^2+ab+b^2)$

(iv) $3x^2-16x+5$

$(3x-1)(x-5)$

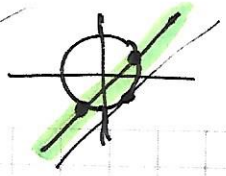
$-x$

$-15x$

5

1 5

2. Solve the following systems of simultaneous equations: $\begin{cases} x^2+y^2=13 \\ x-y=1 \end{cases}$ ✓



$y=x-1$

$x^2+y^2=13$

$x^2+(x-1)^2=13$

$x^2+x^2-2x+1=13$

$2x^2-2x-12=0$

$x^2-x-6=0$

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

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

$x-3=0$ | $x+2=0$

$x=3$ | $x=-2$

$y=x-1$ | $y=x-1$

$y=3-1$ | $y=-2-1$

$y=2$ | $y=-3$

$(3,2)$ | $(-2,-3)$

3.

The number of penguins, P, after t years in a new colony can be found using the following formula.

$$P = a \times 2^t$$

(i) If there are 24 penguins after two years, find the value of a.

(ii) How many years will it take for the number of penguins to first exceed 1500?

(i) $P = 24,\ t = 2$

$P = a \times 2^t$

$24 = a \times 2^2$

$24 = a \times 4$

$a = \frac{24}{4} = 6$

(ii) $P = 6 \times 2^t$

$1500 = 6 \times 2^t$

$2^t = \frac{1500}{6} = 250$

$2^8 > 250$

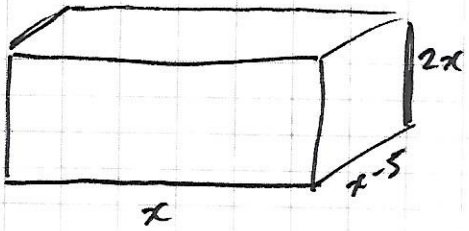
$2^t = 250$

128

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$

4. The width of an open rectangular box is 5cm shorter than its length. The height of the box is twice the length. By letting x equal the length of the box, answer the following:

(i) Write down the volume of the box, $V(x)$, in terms of x.
(ii) What is the volume when $x = 7cm$.
(iii) Why can't the box have a length less than 5cm?



(i) $V(x) = x(x-5)(2x)$ ✓

$= 2x^2(x-5)$

$= 2x^3 - 10x^2$

(ii) $V(7) = 2(7)^3 - 10(7)^2 =$

$= 7(7-5)(14)$

$= 196\ cm^3$

(iii) $x < 5$

$x - 5 > 0$

$x > 5$