ASSIGNMENT 0 SOLUTIONS

1(a) $(-2)^4 = (-2)(-2)(-2)(-2) = 16$

(b) $2^{-10} = \frac{1}{2^{10}} = \frac{1}{1024}$

(c) $0^{-3} = \frac{1}{0^3} = \frac{1}{0}$ = not defined

(d) $\left(\frac{1}{4}\right)^{-3} = \frac{1}{\left(\frac{1}{4}\right)^3} = \frac{1}{\frac{1}{4^3}} = 4^3 = 64$

(e) $\sqrt[3]{64} = 4$ because $4^3 = 64$

(f) $\sqrt[3]{-64} = -4$ because $(-4)^3 = -64$

(g) $\sqrt{-32}$ is not defined

(h) $\sqrt{10000} = 100$ since $100^2 = 10000$

(i) $\sqrt{0} = 0$ since $0^2 = 0$

2 (a) $x^2 - 5 = x^2 - (\sqrt{5})^2 = (x-\sqrt{5})(x+\sqrt{5})$

(b) $4 - a^2 = (2-a)(2+a)$

(c) $x^2 + 1$ not possible to factor

(d) $x^3 - 4x = x(x^2-4) = x(x-2)(x+2)$

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

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

(g) $3x^2+4$ does not factor

NOTE: we used the following formulas:

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

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

(b) $(x-y)^2 = x^2-2xy+y^2$

(c) $(x+y)^3 = x^3+3x^2y+3xy^2+y^3$

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

(e) $(a-b)(a+b) = a^2-b^2$

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

if you don't recall this, multiply out:

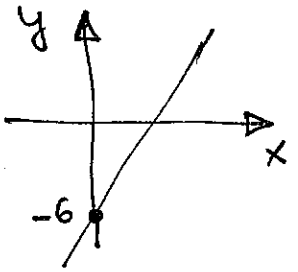
$$(a-b)(a^2+ab+b^2) = a^3+\cancel{a^2b}+\cancel{ab^2}$$
$$-\cancel{ba^2}-\cancel{ab^2}-b^3 = a^3-b^3$$

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

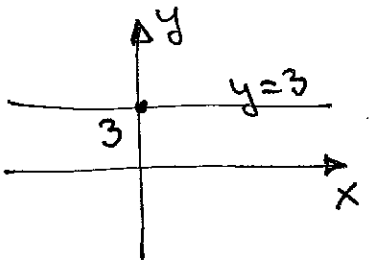
Same comment as in (f)

4 (a) $3x-2y=12 \rightarrow 2y=3x-12 \rightarrow y=\frac{3}{2}x-6$

Line of slope $\frac{3}{2}$ and y-intercept -6

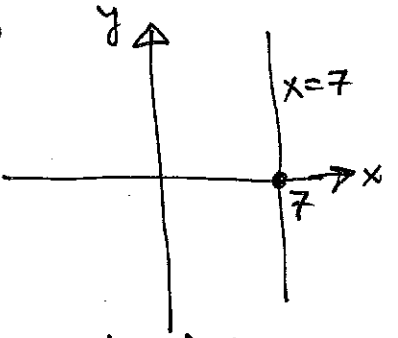


(b)



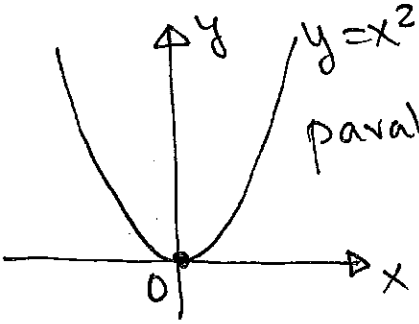
horizontal line

(c)

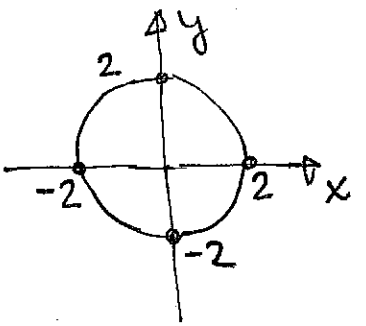


vertical line

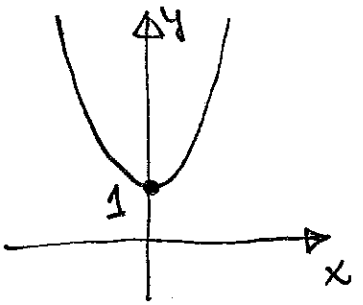
(d)



(e) $x^2+y^2=4$ is a circle of radius 2 centred at origin



(f) parabola from (d) moved up one unit



(g) parabola

x-intercepts: $x^2+2x-4=0$

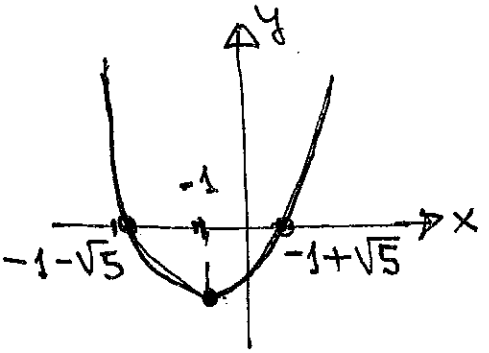
$$x = \frac{-2 \pm \sqrt{4+16}}{2} = \frac{-2 \pm \sqrt{20}}{2}$$

$$\sqrt{20} = \sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$$

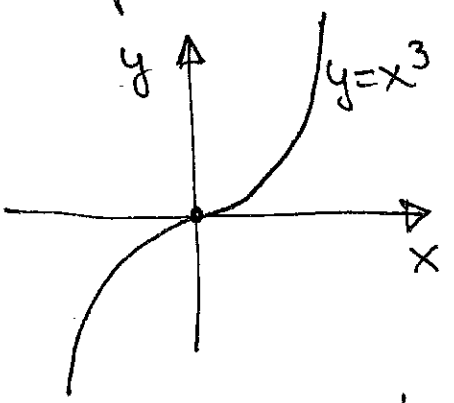
$$x = \frac{-2 \pm 2\sqrt{5}}{2} = -1 \pm \sqrt{5}$$

vertex: $x = -\frac{b}{2a} = -\frac{2}{2} = -1$

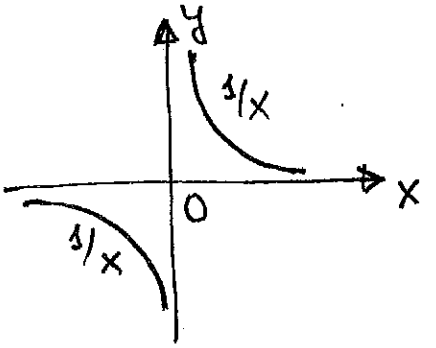
(if $y = ax^2+bx+c$ then vertex is at $x = -b/2a$)



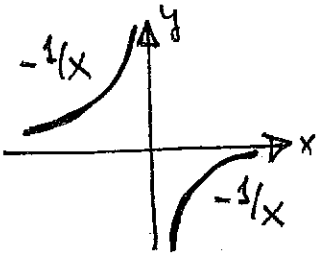
(h) cubic parabola



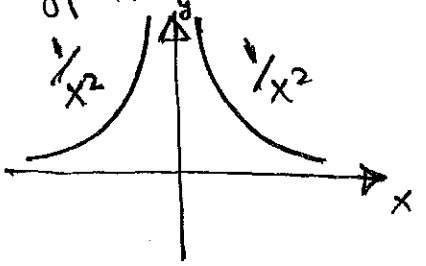
(i) hyperbola



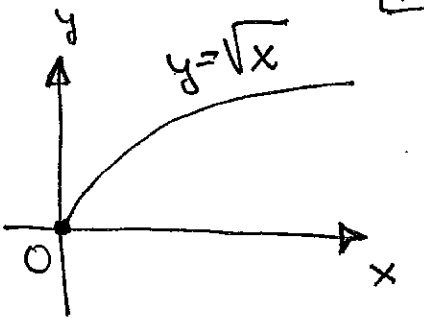
(j) hyperbola from (i) reflected across the x-axis



(k) hyperbola



(l)



(shape is a parabola)

5(a) $3x-12y=4$

solution = all points in the line $3x-12y=4$

(infinitely many solutions)

(b) $3.2x-16.2=-1.3(2-3x)$

$3.2x-16.2=-2.6+3.9x$

$3.2x-3.9x=-2.6+16.2$

$-0.7x=13.6$

$x=-\frac{13.6}{0.7}$ (leave as is, or use calculator)

(c) $x^2+9x+14=(x+2)(x+7)=0$

$\rightarrow x=-2,-7$

(d) $2x^2-5x+3=(2x-3)(x-1)=0$

$2x-3=0 \rightarrow x=\frac{3}{2}$

$x-1=0 \rightarrow x=1$

(e) $x^3 - 27x = x(x^2 - 27) = 0$

$x = 0$ or $x^2 - 27 = 0$

$x = \pm\sqrt{27}$

(f) $x^2 - 6x - 4 = 0$

$$x = \frac{6 \pm \sqrt{6^2 - 4(-4)}}{2} = \frac{6 \pm \sqrt{52}}{2}$$

to simplify: $\sqrt{52} = \sqrt{4 \cdot 13} = 2\sqrt{13}$

$$x = \frac{6 \pm 2\sqrt{13}}{2} = 3 \pm \sqrt{13}$$

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

$$x = \frac{4 \pm \sqrt{16 - 4 \cdot 3 \cdot 10}}{6} = \frac{4 \pm \sqrt{16 - 120}}{6}$$

negative number

no solutions

(h) $x^2 - 8x + 11 = 0$

$(x-4)^2 - 4^2 + 11 = 0$

$(x-4)^2 = 5$

$x - 4 = \pm\sqrt{5}$

$x = 4 \pm \sqrt{5}$