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

crosses x when $y = 0$

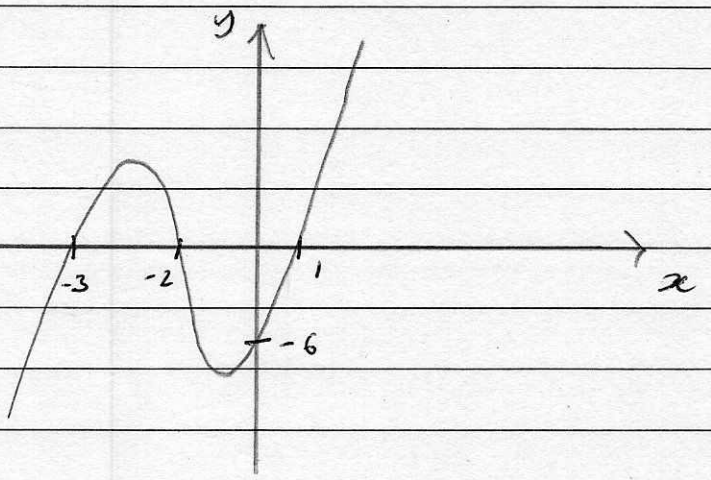
$(x+3)(x+2)(x-1) = 0$

$x = -3 \quad x = -2 \quad x = 1$

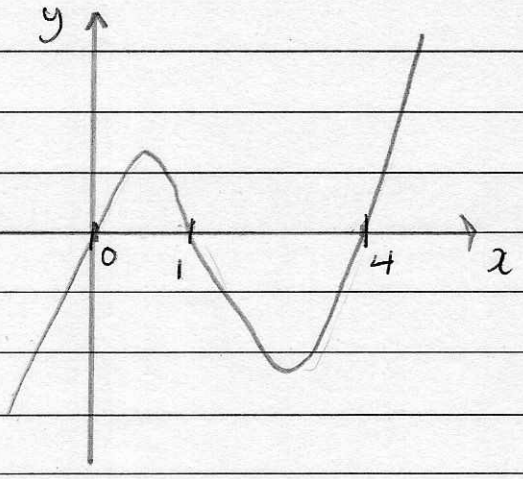
crosses y when $x = 0$

$y = (3)(2)(-1) = -6$

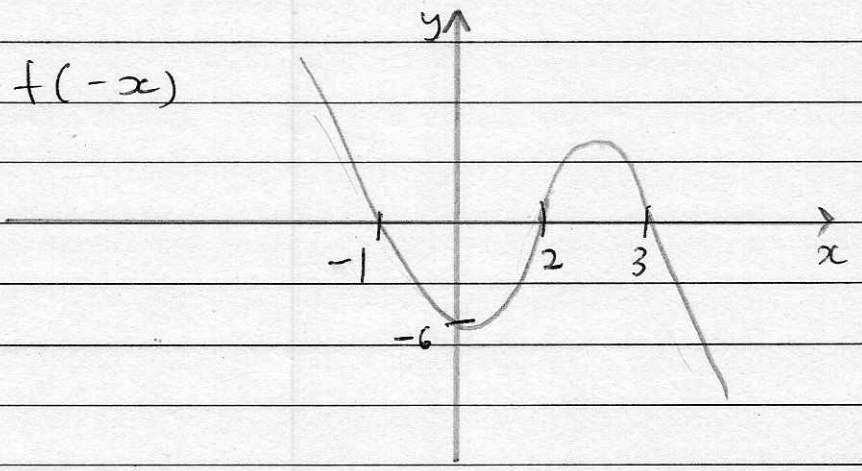
$y = f(x)$



b i) $y = f(x-3)$



ii) $y = f(-x)$

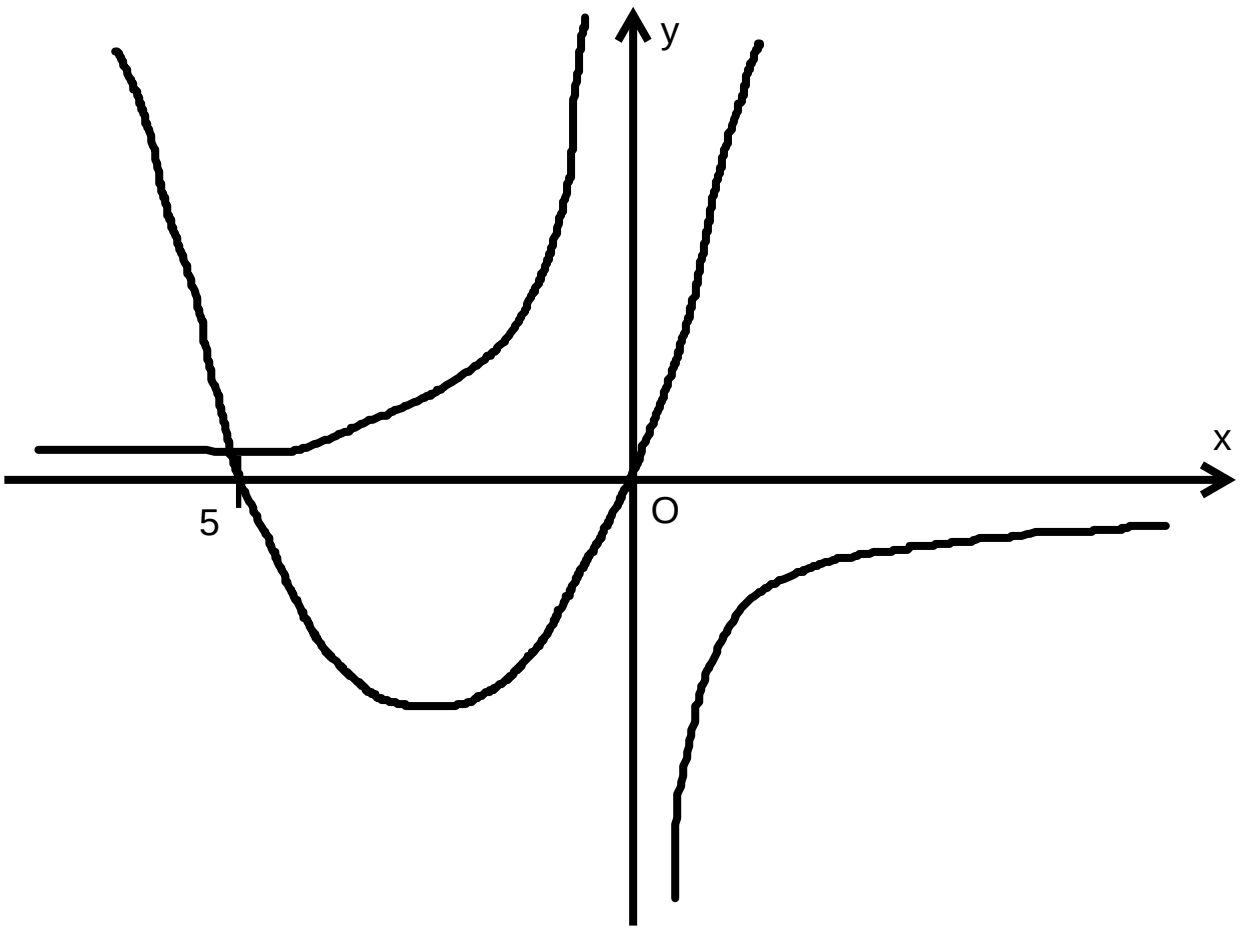


2a) $y = x^2 + 5x$

$y = x(x+5)$

crosses x when $y=0$ $\quad x(x+5) = 0$

$x = 0 \quad x = -5$



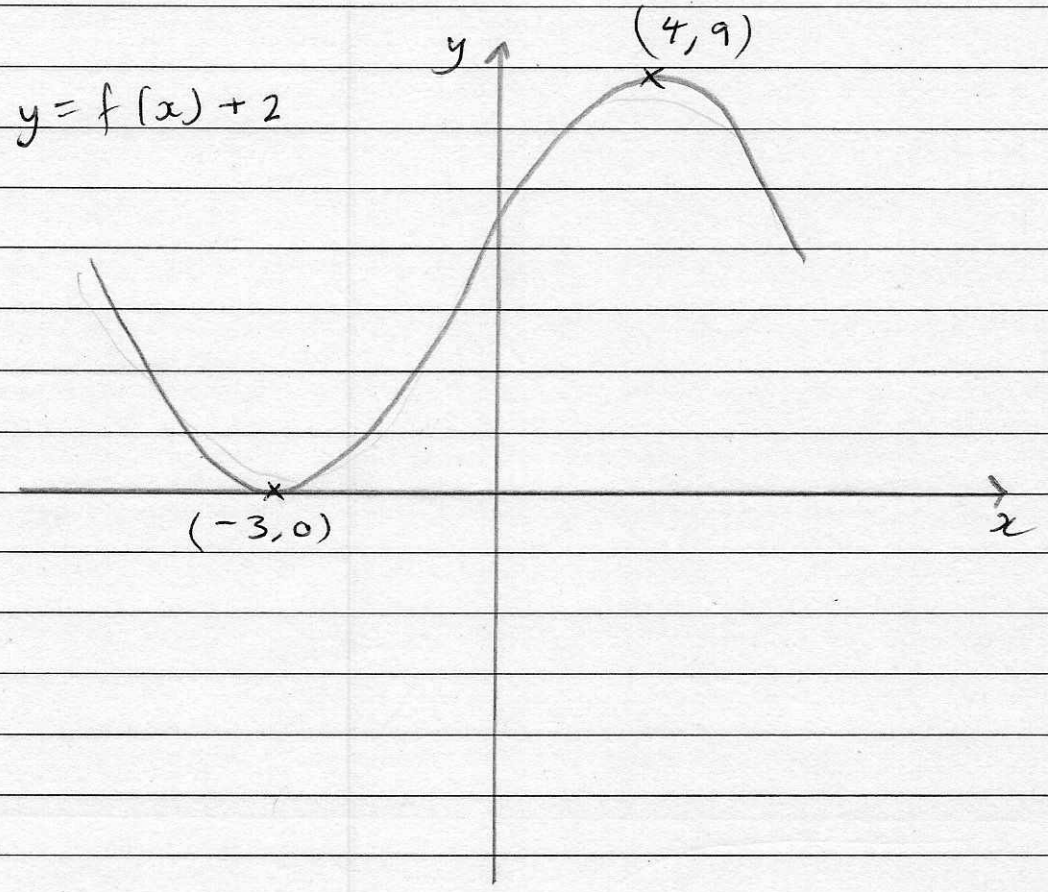
b) $x^2 + 5x + \frac{1}{x} = 0$

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

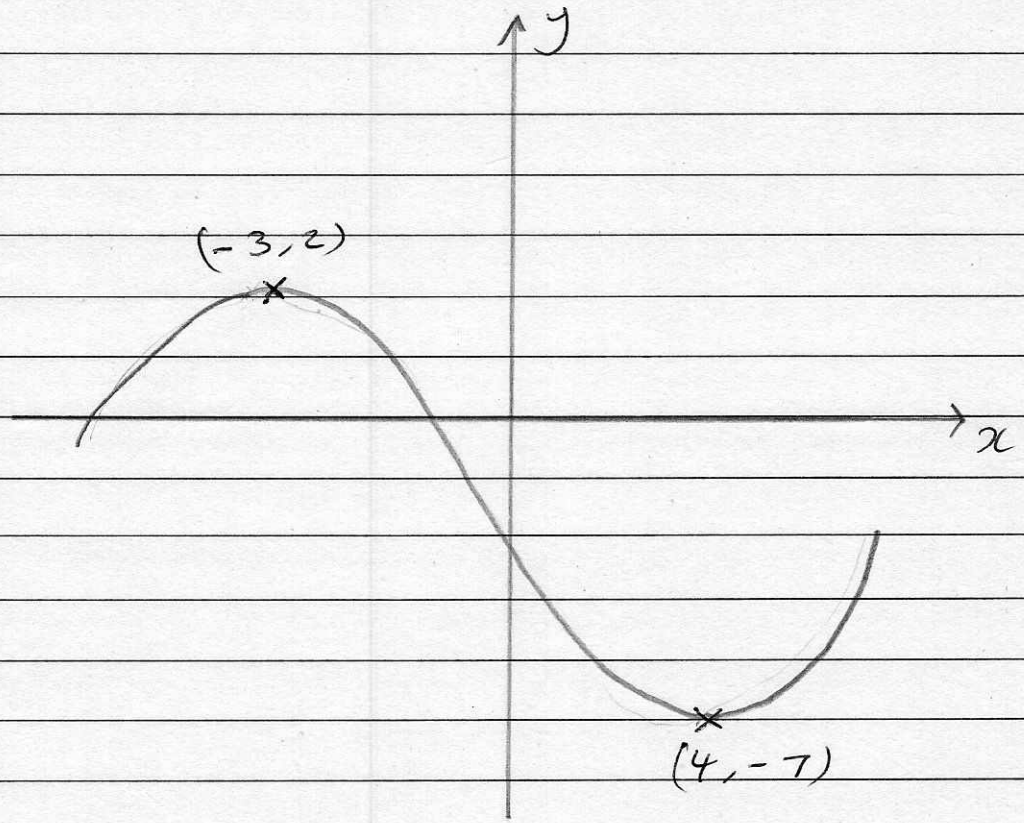
There is one solution as the graph intersects once.

3 i)

$y = f(x) + 2$



ii)



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

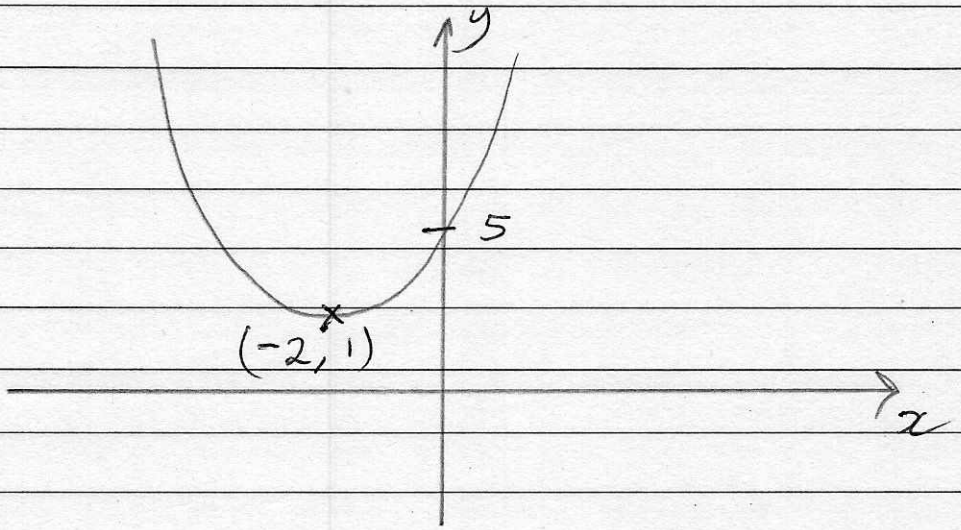
$= (x+2)^2 - 4 + 5$

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

Minimum point at $(-2, 1)$

b) crosses y when $x = 0$ $\quad y = (0)^2 + 4(0) + 5$

$= 5$



c) i) (2, 2)

ii) (-1, 1)

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

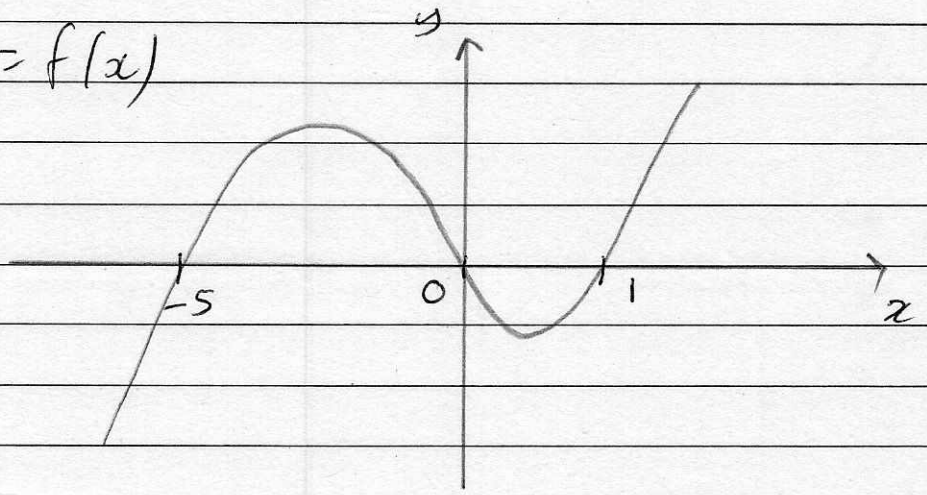
$= x(x-1)(x+5)$

Crosses x when $y = 0$

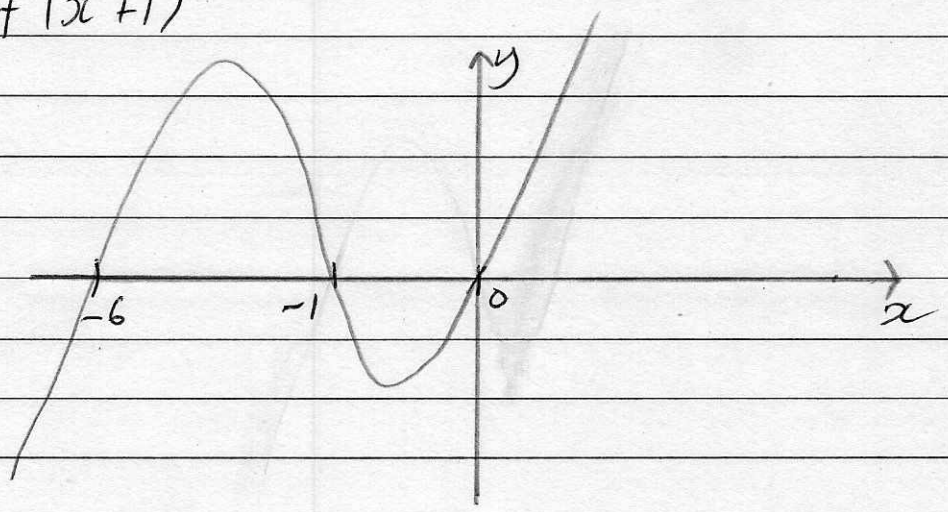
$x(x-1)(x+5) = 0$

$x = 0 \quad x = 1 \quad x = -5$

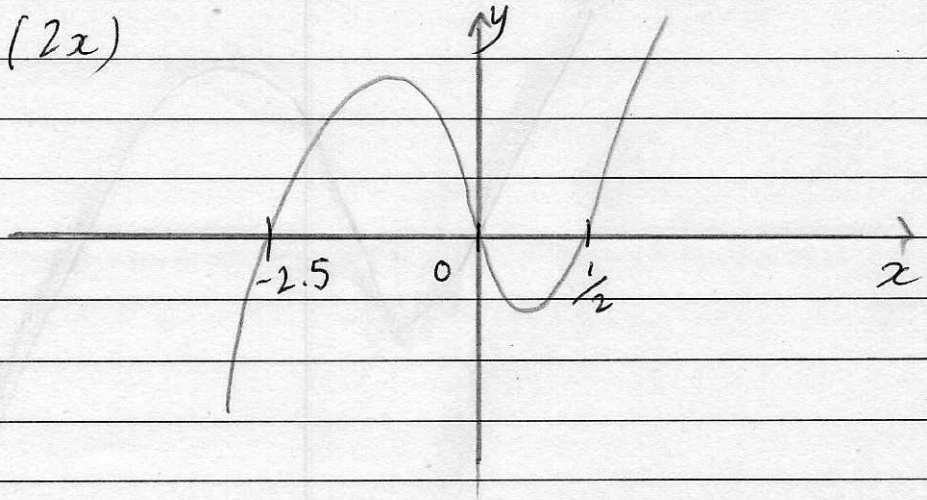
$y = f(x)$



b i) $y = f(x+1)$



ii) $y = f(2x)$



6 $y = \frac{1}{x} + 2$

Crosses y when $x = 0$ X (No solutions)

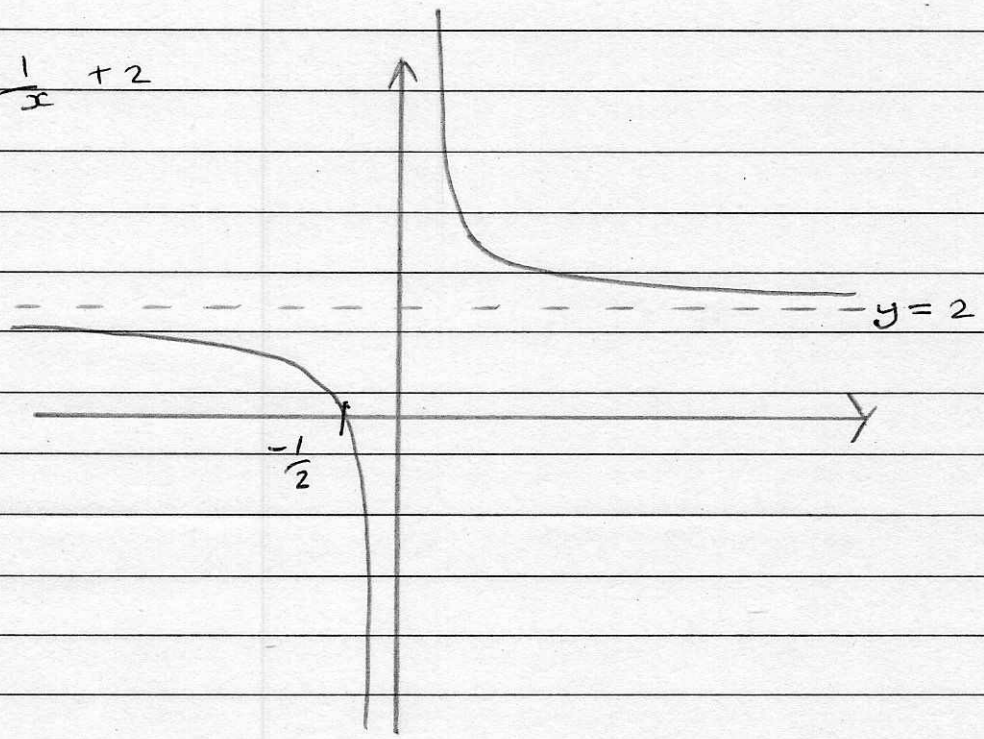
Crosses x when $y = 0$

$$0 = \frac{1}{x} + 2$$

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

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

$y = \frac{1}{x} + 2$



7a/ $f(x) = (x+4)(x-1)(2-x)$

crosses x when $y=0$

$0 = (x+4)(x-1)(2-x)$

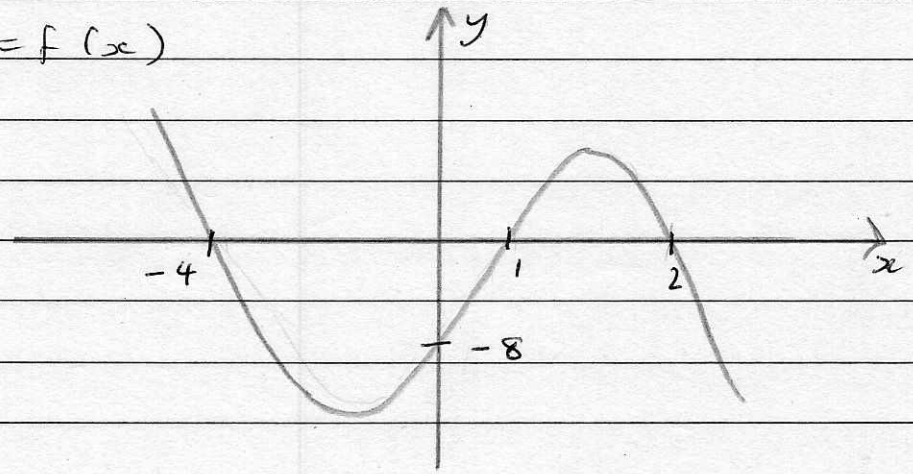
$x=-4 \quad x=1 \quad x=2$

crosses y when $x=0$

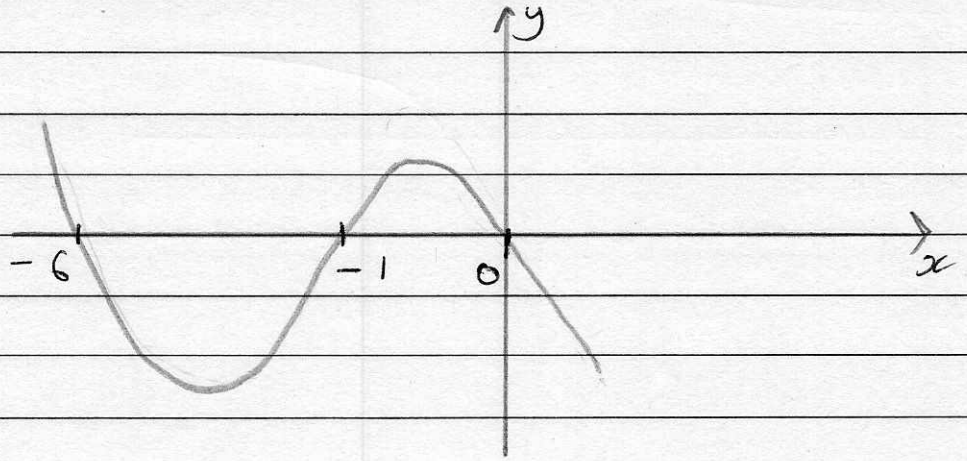
$y = (4)(-1)(2)$

$= -8$

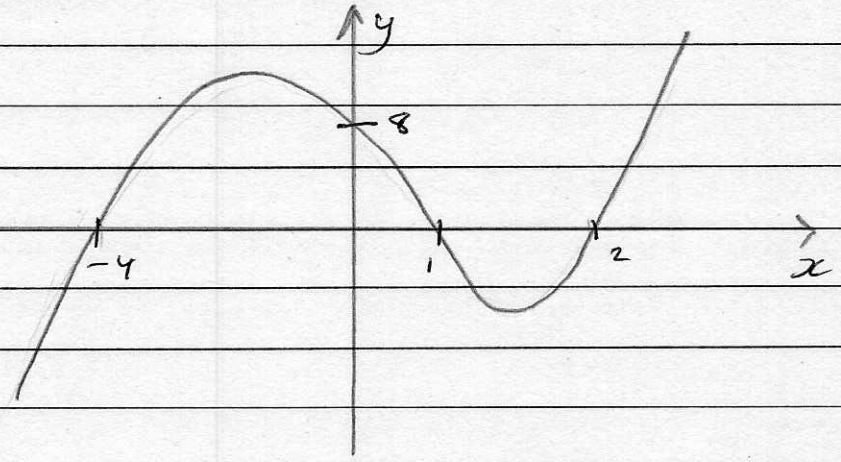
$y=f(x)$



b/ $y=f(x+2)$



ii/ $y=-f(x)$



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

crosses x when $y=0$

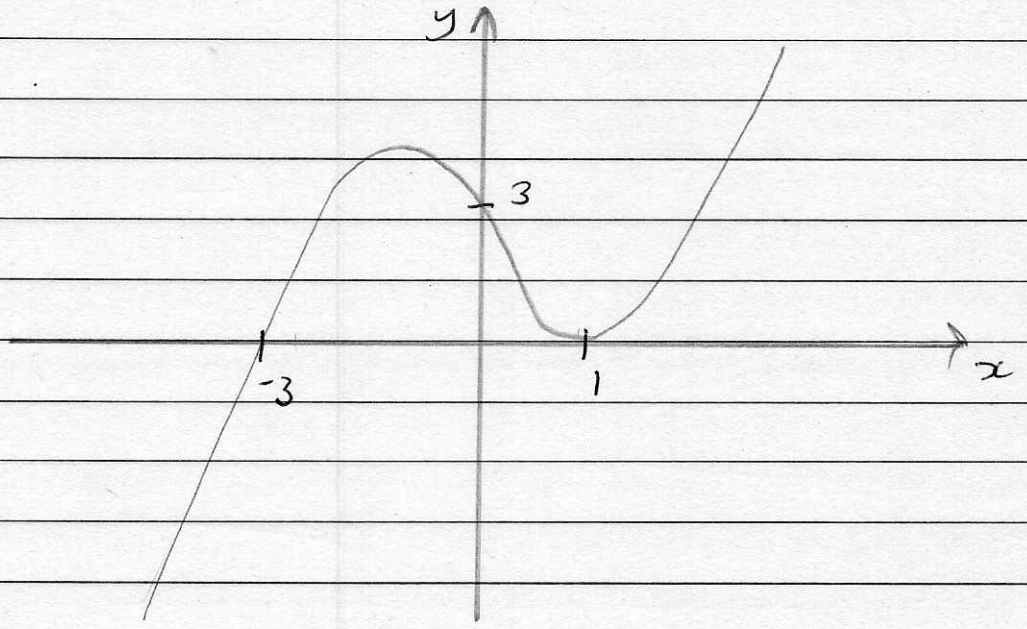
$0 = (x+3)(x-1)^2$

$x = -3 \quad x = 1$

crosses y when $x=0$

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

$= 3$



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

$= (x+5)(x+1)^2$