3c) $(-1, 7)$

$$y = (x+1)^2 + 7$$

$$\underline{y = x^2 + 2x + 8}$$

11d)

$5x^2 - 15x + 11 = 0$

roots are $\alpha, \beta$

$5(x^2 - 3x) = -11$

$x^2 - 3x = -\frac{11}{5}$

$(x - \frac{3}{2})^2 = -\frac{11}{5} + \frac{9}{4}$

$= \frac{1}{20}$

$x - \frac{3}{2} = \pm \frac{1}{2\sqrt{5}}$

$x = \frac{3}{2} \pm \frac{1}{2\sqrt{5}}$

$\alpha + \beta = \frac{3}{2} + \frac{1}{2\sqrt{5}} + \frac{3}{2} - \frac{1}{2\sqrt{5}}$

$= 3$

$-\frac{b}{a} = \frac{15}{5}$

$= 3$

$\therefore \underline{\alpha + \beta = -\frac{b}{a}}$

$\alpha\beta = \left(\frac{3}{2} + \frac{1}{2\sqrt{5}}\right)\left(\frac{3}{2} - \frac{1}{2\sqrt{5}}\right)$

$= \frac{9}{4} - \frac{1}{20}$

$= \frac{44}{20}$

$= \frac{11}{5}$

$\frac{c}{a} = \frac{11}{5}$ $\therefore \underline{\alpha\beta = \frac{c}{a}}$

16/ $f(x) = (x-h)^2 + k$

$f'(x) = 2(x-h)^1(1)$

$= 2(x-h)$

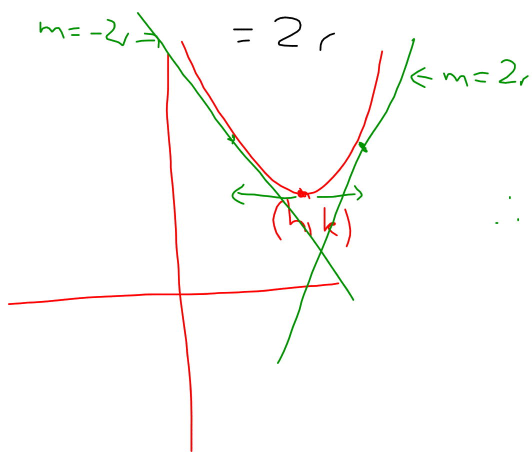
$f'(h+r) = 2(h+r-h)$

$= 2r$

$-f'(h-r) = -2(h-r-h)$

$= 2r$

$= f'(h+r)$




$\therefore$ curve is symmetric about $x = h$.

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$$y = a(x-h)^2 + k$$

a) $(0, c)$

$$c = ah^2 + k$$

$$ah^2 = c - k$$

$$a = \frac{c-k}{h^2}$$

b) $(1, 2)$

$$2 = a(1-h)^2 + k$$

$$a(1-h)^2 = 2 - k.$$

$$a = \frac{2-k}{(1-h)^2}$$

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$$y = a(x-h)^2 + k$$

c) $y = a(x^2 - 2xh + h^2) + k$

$\therefore$ coefficient of $x$ is $-2ax$

$$-2ah = b$$

$$a = \frac{-b}{2h}$$

$$\therefore y = \frac{-b}{2h}(x-h)^2 + k$$

17d)

$$y = a(x-h)^2 + k$$

when $x = \alpha$, $y = 0$

$$0 = a(\alpha - h)^2 + k$$

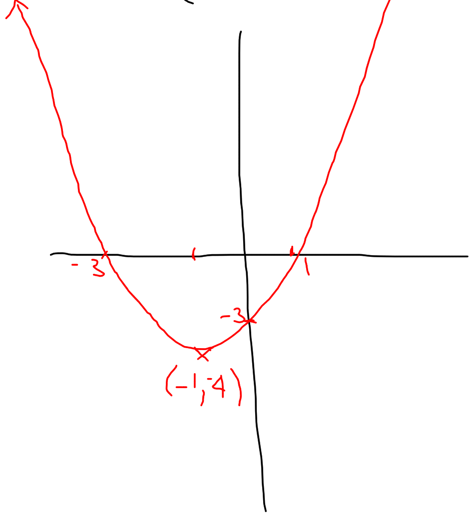
$$a(\alpha - h)^2 = -k$$

$$a = \frac{-k}{(\alpha - h)^2}$$

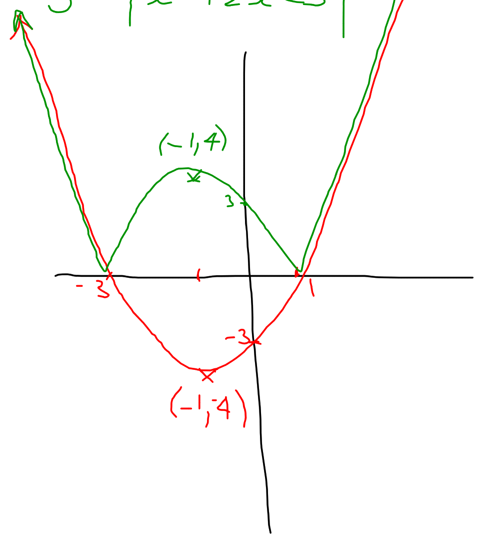
$$\therefore y = \frac{-k}{(\alpha-h)^2}(x-h)^2 + k$$

20/ $y = x^2 + 2x - 3$

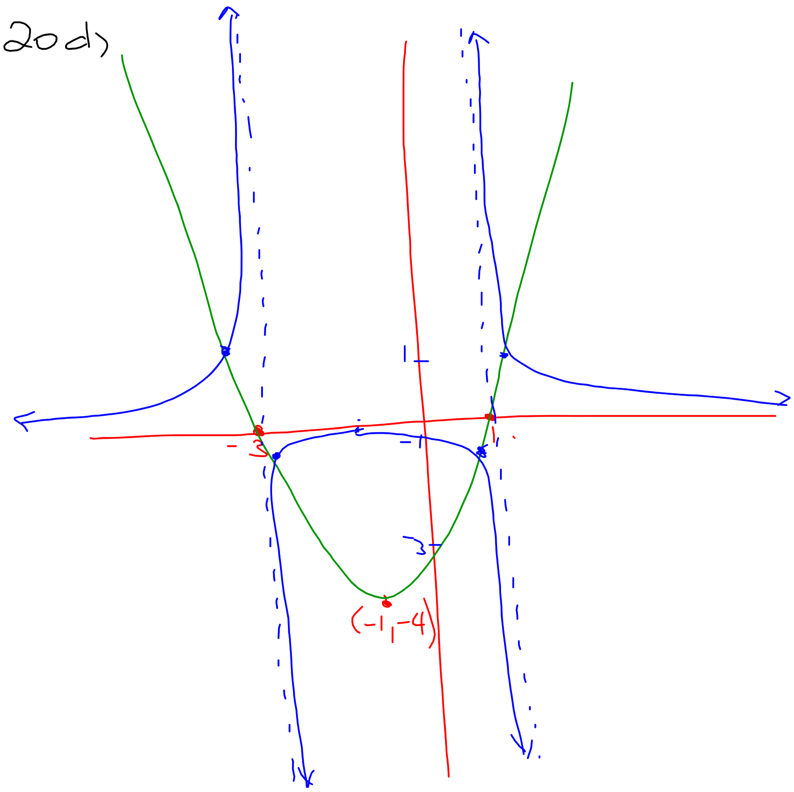
$= (x+1)^2 - 4$




b) $y = |x^2 + 2x - 3|$



20d)




$$x^2+2x-3=1$$
$$x=-1\pm\sqrt{5}$$
$$x^2+2x-3=-1$$
$$x=-1\pm\sqrt{3}$$

$$y=\frac{1}{x^2+2x-3}$$