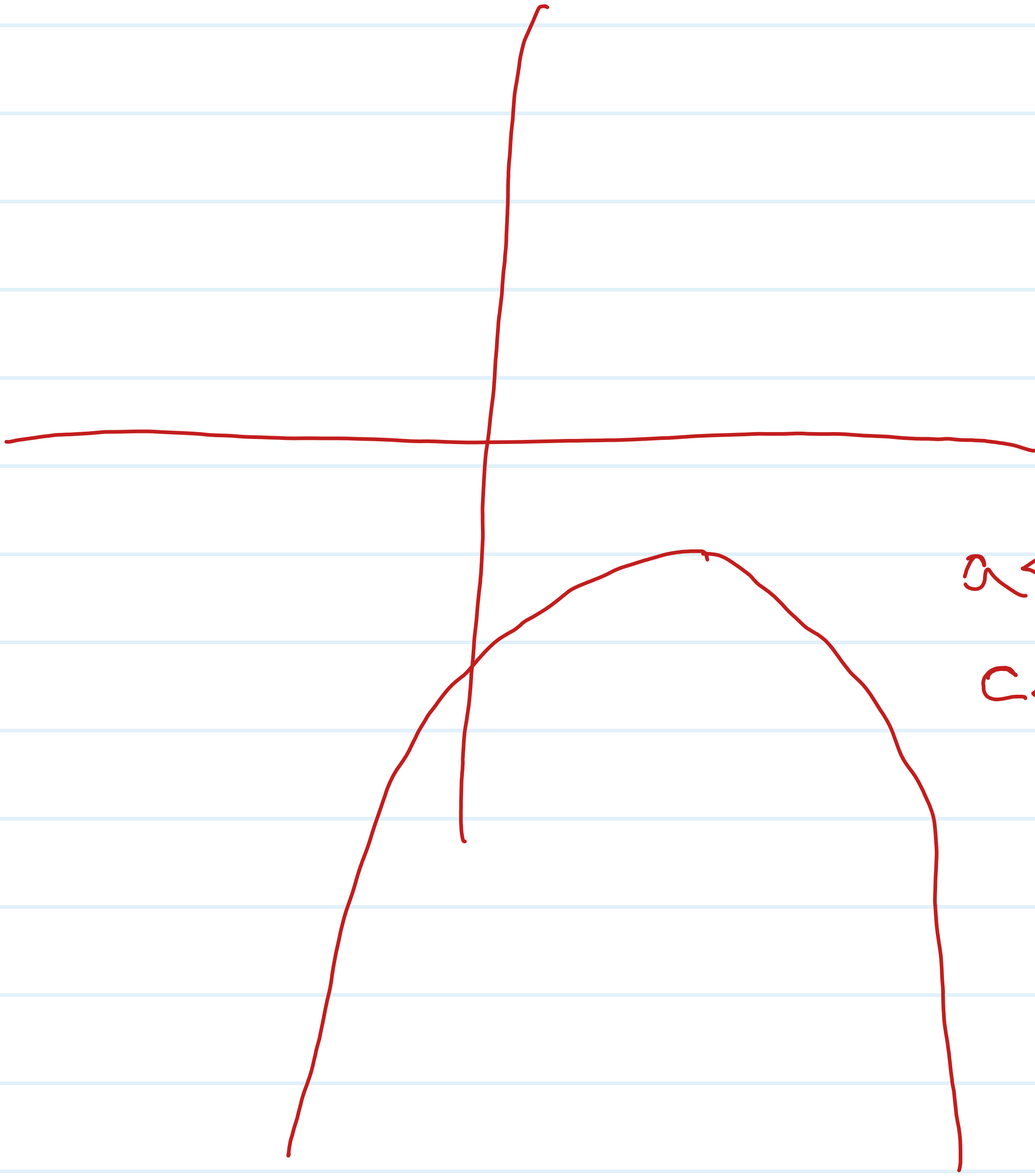
$\boxed{4.}$



$a < 0$

$c < 0$

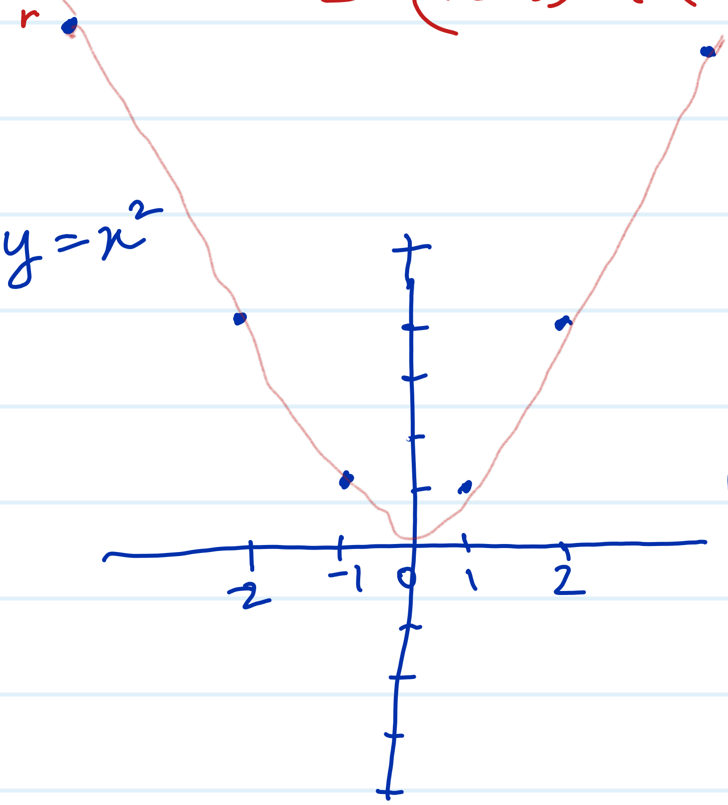
(1)

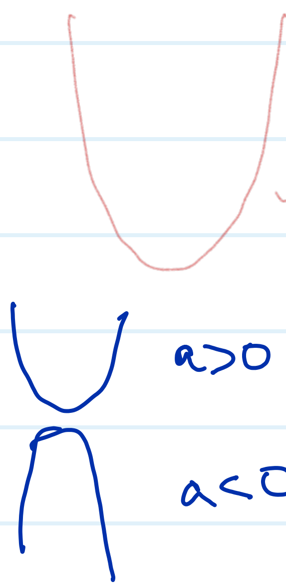
$\boxed{5}$ $px^3 + qx^2 + rx + s = 0$

$$\frac{-s}{p} = x_1 x_2 x_3$$

$$= (a-b)\,a\,(a+b)$$

$\boxed{4.}$ $y = x^2$



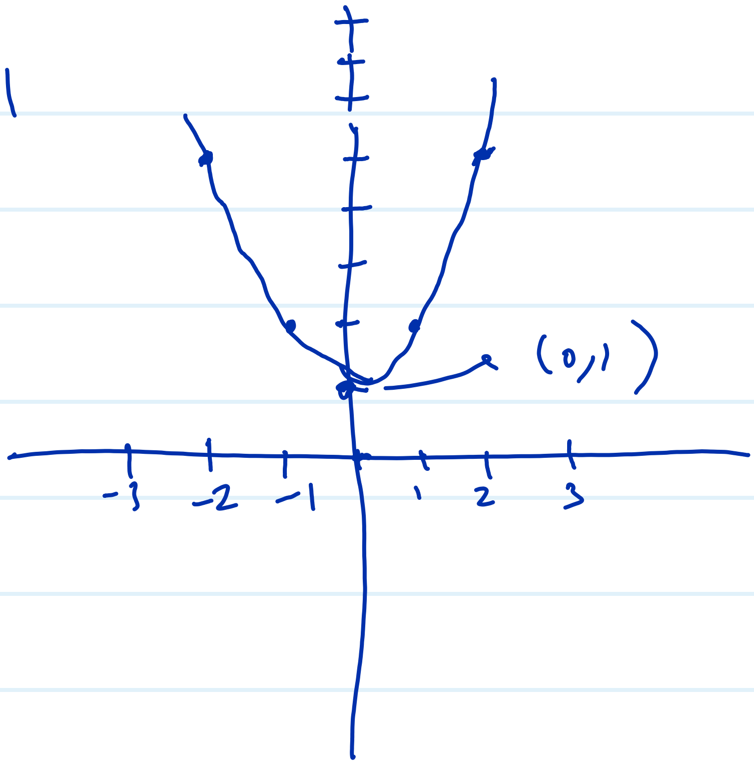


$y = ax^2 + bx + c$

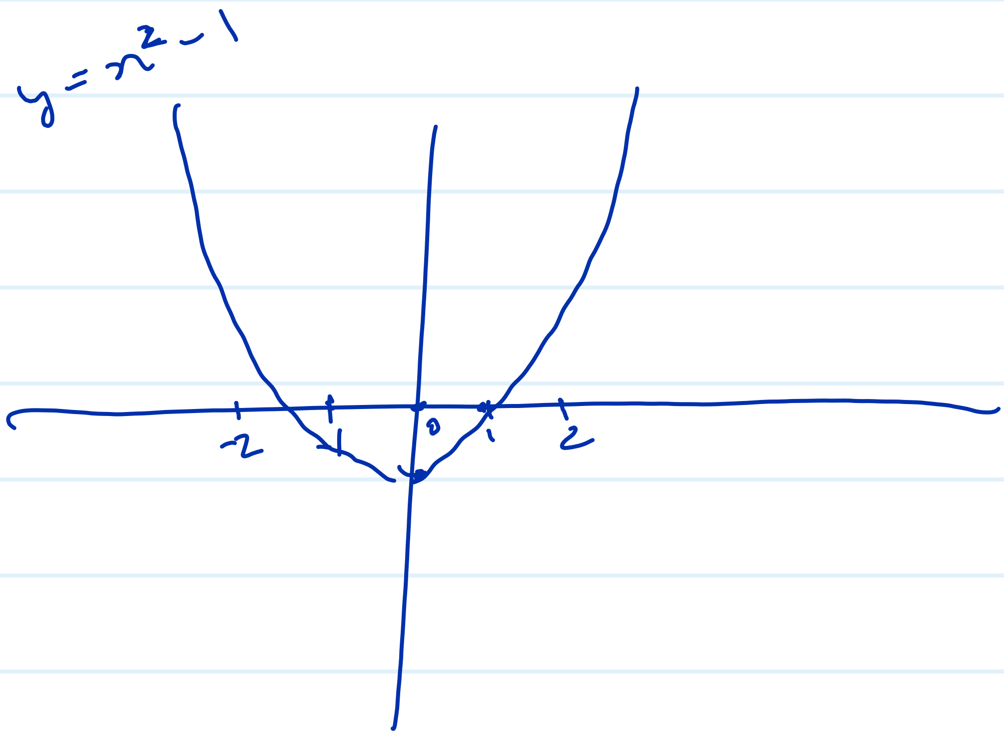
$a > 0$

$a < 0$

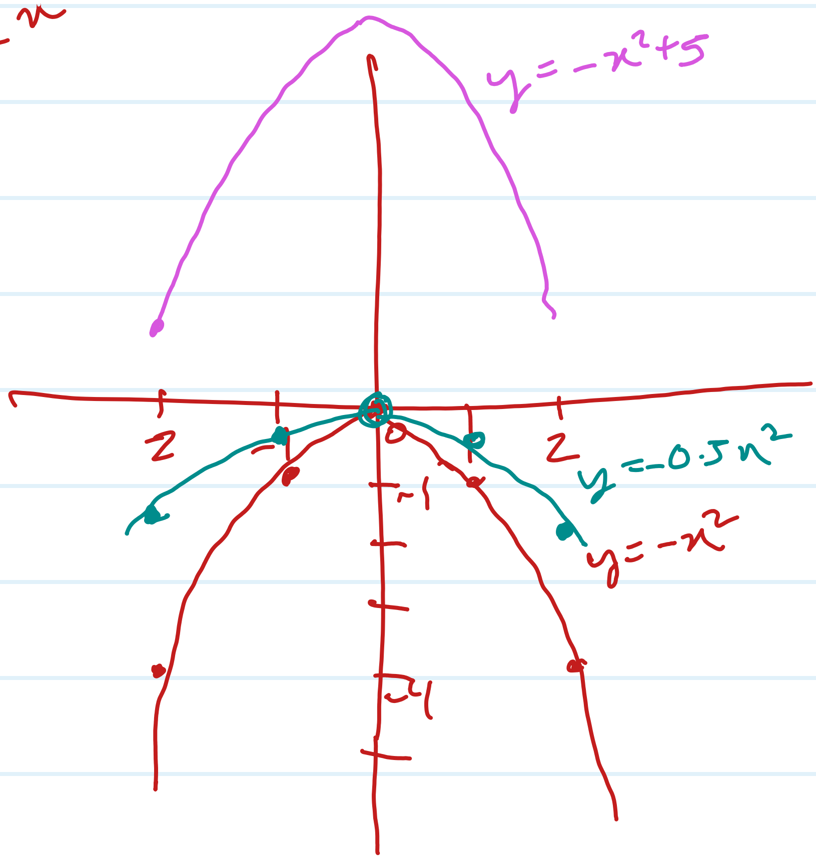
$y = x^2 + 1$



$y = x^2 - 1$



$y = -1x^2$



$y = -0.5x^2$

$$y = ax^2 + bx + c$$

or $\frac{y}{a} = \underbrace{x^2 + \frac{b}{a}x} + \frac{c}{a}$

or $\boxed{\frac{y}{a} = \left(x + \frac{b}{2a}\right)^2 - \left(\frac{b}{2a}\right)^2 + \frac{c}{a}}$

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2$$

$x = -\frac{b}{2a} \Rightarrow (\ )^2 = 0$

or $\frac{y}{a} = \left(x + \frac{b}{2a}\right)^2 + \left\{\frac{c}{a} - \left(\frac{b}{2a}\right)^2\right\}$

1. $(x - x_1)^2$

2. $(x - x_1)(x - x_2)$

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

$(x-7)^2$

$x^2 - 14x + 49$

$\{(x-7)^2 - 49\}$

min $\{(x-7)^2 + 8\}$

min $(x^2 - 14x + 57)$

arg min. $\frac{y}{a}$: $x = -\frac{b}{2a}$

$$\left(\frac{y}{a}\right)_{min} = \left\{ \frac{c}{a} - \left(\frac{b}{2a}\right)^2 \right\}$$

or $y = a\left(x+\frac{b}{2a}\right)^2 + \left\{c - \frac{b^2}{4a}\right\}$

arg min. y : $x = -\frac{b}{2a}$

$y_{min} = \left\{c - \frac{b^2}{4a}\right\}$

$y = ax^2 + bx + c$

or $\boxed{y = a\left(x+\frac{b}{2a}\right)^2 + \left(c - \frac{b^2}{4a}\right)}$

if $y = 0$

then $0 = a\left(x+\frac{b}{2a}\right)^2 + \left(c - \frac{b^2}{4a}\right)$

or $\frac{b^2}{4a} - c = a\left(x+\frac{b}{2a}\right)^2$

or $\frac{b^2}{4a^2} - \frac{c}{a} = \left(x+\frac{b}{2a}\right)^2$

$\sqrt{64} = \pm 8$

$x^2 - 64 = 0$

$x = \pm 8$

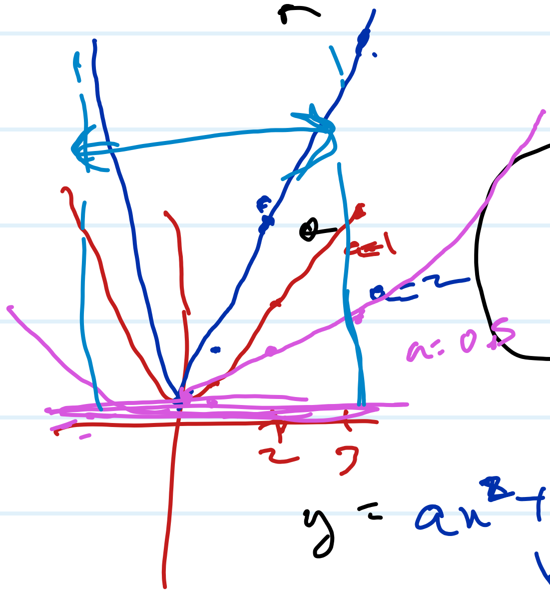
or $\pm\sqrt{\frac{b^2}{4a^2} - \frac{c}{a}} = \left(x+\frac{b}{2a}\right)$

or $$x = -\frac{b}{2a} \pm \sqrt{\frac{b^2}{4a^2} - \frac{c}{a}}$$

or $$x = -\frac{b}{2a} \pm \sqrt{\left(\frac{1}{4a^2}\right)\left\{b^2 - 4ac\right\}}$$

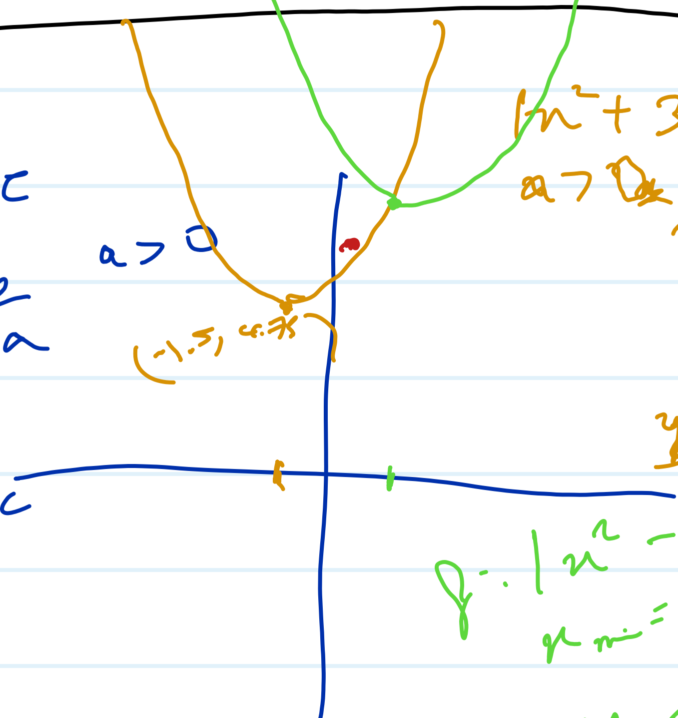
or $$x = -\frac{b}{2a} \pm \frac{1}{2a}\sqrt{b^2 - 4ac}$$

$$\boxed{x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$$



$y = ax^2 + bx + c$

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



$1x^2 + 3x + 7$

$a > 0$

$x_{min} = -\frac{b}{2a}$

$= -\frac{3}{2}$

$y = \frac{19}{4}$

$g: 1x^2 - 3x + 9$

$x_{min} = \frac{3}{2}$

$y = \frac{27}{4} = 6.75$

$y\left(x = -\frac{b}{2a}\right)$

$y_1 = a \times \left(-\frac{b}{2a}\right)^2 + b\left(-\frac{b}{2a}\right) + c$

$y = \frac{b^2}{4a} - \frac{b^2}{2a} + c$

$$\boxed{y = \frac{-b^2}{4a} + c}$$

$f: -2x^2 + x + 5$

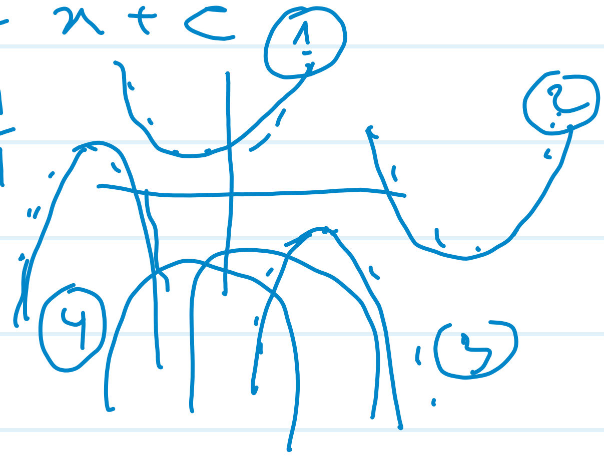
$-a\left(x + \frac{b}{2a}\right)^2 + \left(\ldots \right)$

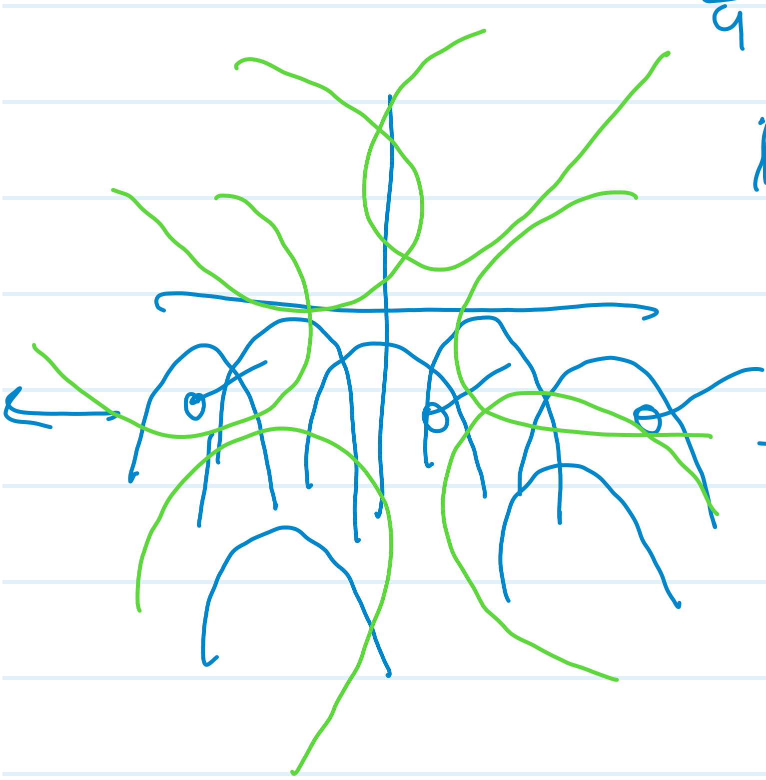
$x = -\frac{b}{2a}$

$x = \frac{1}{4}$ $y = \frac{41}{8} = 5.25$

$\boxed{4.}$ $f(x) = ax^2 + x + c$

$ac > \frac{1}{4}$



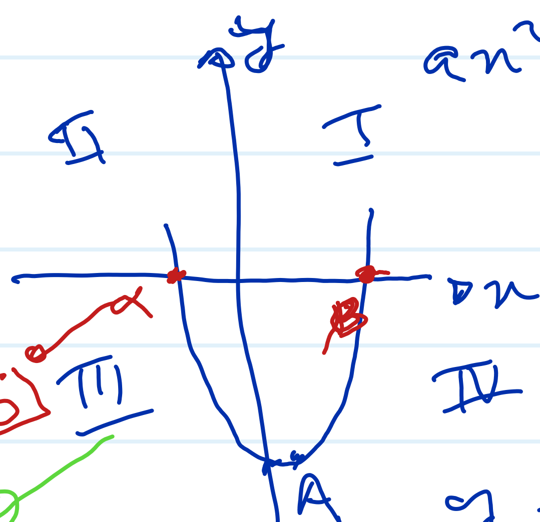


$\rightarrow$ $a < 0$

$ac > \frac{1}{4} \Rightarrow c < 0$

$\boxed{(2)\ a<0,\ c<0}$ Ans

$\boxed{C)\ 1.}$



$ax^2 + bx + c$

$a > 0$ $\exists$ min $= A$

$x_v = -\frac{b}{2a} > 0$

$\Rightarrow \boxed{b < 0}$

$\alpha \cdot \beta = \frac{c}{a}$

$\frac{c}{a} < 0$

$a>0 \Rightarrow \boxed{c<0}$

$y = \frac{-b^2}{4a} + c < 0$

$(-) + c < 0$

(1) $a > 0$

(2) $c < 0$

(3) $a > 0$ and $c > 0$

(4) $b > 0$

$(1, -1, \frac{1}{8})$ $\Rightarrow$

$\rightarrow c \in$ ☹ $\in$

$b = -1$

$a = 1$

$y = \frac{-1}{4} + c$

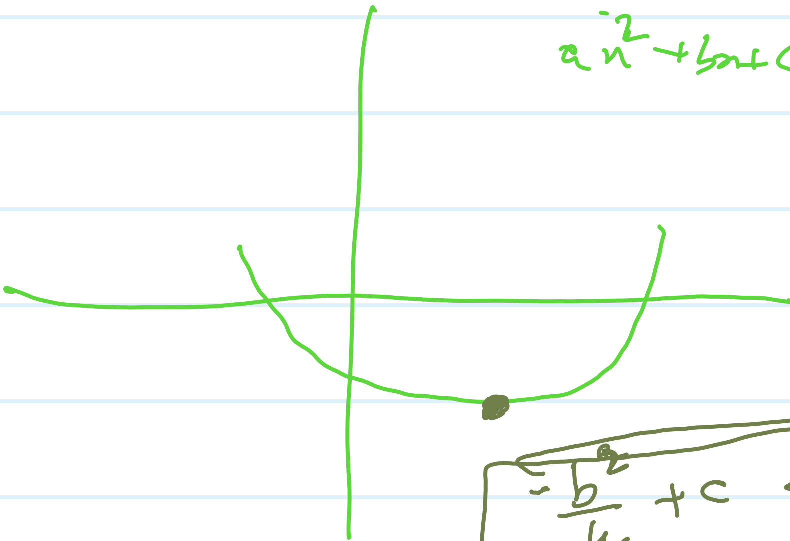
$c \in (-\infty, \frac{1}{4})$

$c = \frac{1}{8}$

$\boxed{(1)(2)}$ Ans

C. $\boxed{2}$

ax^2+bx+c



$\boxed{a>0}$

$-\frac{b}{2a}>0 \Rightarrow \boxed{b<0}$

$\alpha\beta = \frac{c}{a} < 0 \Rightarrow \boxed{c<0}$

$\boxed{-\frac{b^2}{4a}+c<0}$

(1) $\frac{-b}{c}+\frac{a}{c}$ ○ $\quad (-) = (-) + (-)$

(2) $\frac{a^2c+b^2c}{ab}$ ✗ $\quad \frac{(+)(-)+(+)(-)}{(+)(-)} = (+)$, $\quad (+)(-) = (-)$

(3) abc ✗

(4) $ab+ac-bc$ ○ $(+)$

$(-) \quad (-) - (+)$

$(-)+(-)+(-) = (-)$

$ab+ac+bc$

$(-) \quad (-) \quad (+) \qquad (-)$

$\boxed{(1)\ (4)}$ Ans

$\boxed{A}\ \boxed{4)}$ $f: px^2 + qx + r$ $\quad y = px^2 + qx + r$

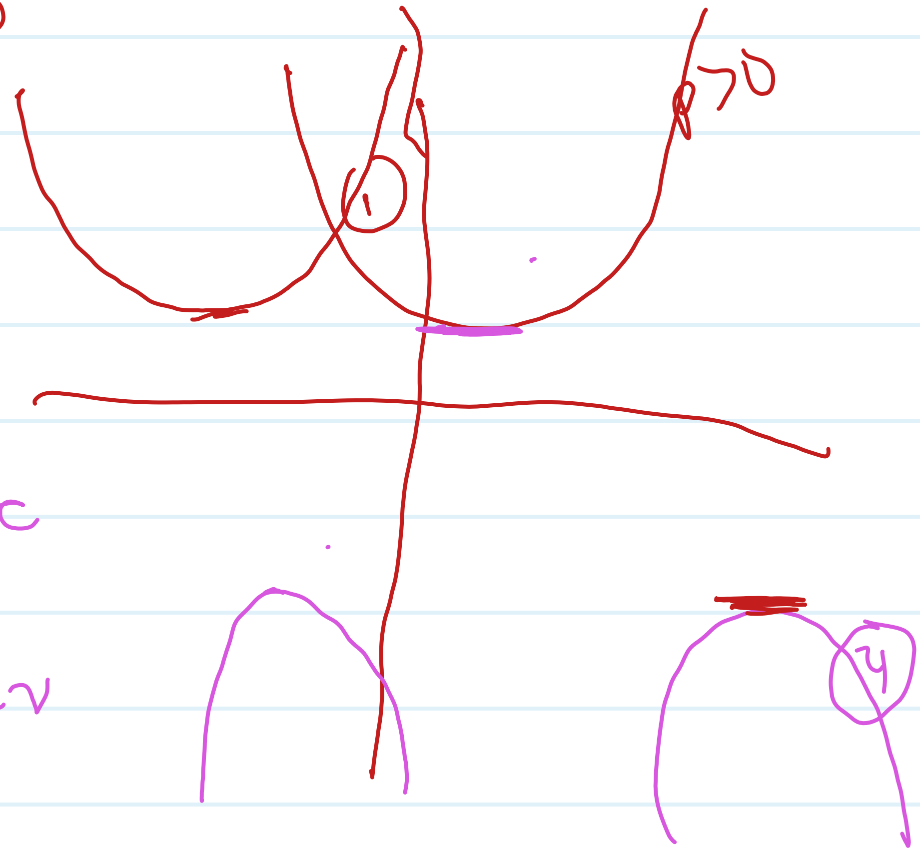
$f.\ p > 0$

p, q, r

$x^* = \frac{-b}{2a}$

$y^* = \frac{-b^2}{4a} + c$

or $y^* = \frac{-q^2}{4p} + r$



$p\,y^* > 0$

$p\left(\frac{-q^2}{4p} + r\right) > 0$

or $-\frac{q^2}{4} + rp > 0$

A. $\boxed{4.}$ $\boxed{q^2 < 4pr}$ Ans