

1- $y = x^2 + bx + r$ $y_{max} = V \rightarrow \frac{-\Delta}{2a} = V \Rightarrow \frac{b^2 + 4r}{4} = V \Rightarrow b^2 - 4r = 0 \rightarrow (b-2)(b+2) = 0$
 $\rightarrow b = 2$ or $b = -2$

2- a) $f(x) = x^2 + rx + r \rightarrow x^2 = t \Rightarrow t^2 + t + r \rightarrow \Delta < 0 \Rightarrow$ no real roots

b) $f(x) = (x-r)^2 - r(F-r) - 1d$

$\hookrightarrow (F-r) = t \Rightarrow t^2 - 2t - 1d = 0 \rightarrow (t-1)(t+1) = 0 \rightarrow t = 1$ or $t = -1$
 $\rightarrow F-r = 1 \rightarrow F = r+1$ or $F-r = -1 \rightarrow F = r-1$

3- $Fx^2 - 4x + m = 0$ $\alpha, \beta \rightarrow \alpha = r + \beta \rightarrow \alpha + \beta = r + \beta + \beta = r + 2\beta = \frac{4}{F}$

$\Rightarrow \beta = 1 \Rightarrow \alpha = r \Rightarrow \frac{C}{a} = \frac{m}{F} = r \Rightarrow m = rF$ $Fx^2 - 4x + rF = 0$ $\Delta > 0$

4- $Fx^2 - 4x + m - 1 = 0$ $\alpha - \beta = 1 \rightarrow \beta = r\alpha - 1$

$S = r\alpha - 1 = r \Rightarrow r\alpha = r + 1 \Rightarrow \alpha = r + \frac{1}{r}$ $\beta = 0$ $\rightarrow \frac{C}{a} = \frac{m-1}{F} = 0 \Rightarrow m = 1$ $Fx^2 - 4x = 0$ $\Delta > 0$

5- $-mx^2 + rx + m + r = 0 \rightarrow \alpha = \frac{1}{\beta}$

$\hookrightarrow \frac{F}{m} = \beta + \frac{1}{\beta} = \frac{\beta^2 + 1}{\beta} \rightarrow F\beta = m\beta^2 + m \rightarrow m\beta^2 - F\beta + m = 0 \rightarrow \Delta = 0$

$\hookrightarrow \frac{m^2 - r}{-m} = 1 \Rightarrow m^2 + m - r = 0 \rightarrow (m+r)(m-1) = 0$
 $m = -r$ or $m = 1$
 $\rightarrow r\beta^2 + r\beta - r = 0 \rightarrow \beta^2 + \beta - 1 = 0 \rightarrow \beta = \frac{-1 \pm \sqrt{5}}{2}$
 $\rightarrow \alpha = \frac{1}{\beta}$
 $\Delta > 0$

6- $x^2 - mx + r = 0$ $\alpha\beta = r \rightarrow \alpha = \frac{r}{\beta}$

$r = \alpha\beta = \frac{r}{\beta} \Rightarrow \beta = \frac{r}{r} = 1$ $\alpha = \frac{r}{1} = r$

$\hookrightarrow m = \alpha + \beta = r + 1 \Rightarrow \frac{F}{r} = m \Rightarrow \frac{F}{r} = r + 1 \Rightarrow F = r^2 + r$ $x^2 - \frac{F}{r}x + r = 0$ $\Delta > 0$

7- $x^2 - 5x + m = 0$ $\alpha = r\beta$

$\hookrightarrow r\beta = 5 \Rightarrow \beta = \frac{5}{r}$

$\hookrightarrow r\beta^2 = m \Rightarrow m = r \cdot \frac{25}{r^2} = \frac{25}{r}$ $x^2 - 5x + \frac{25}{r} = 0$ $\Delta > 0$

8- $x^2 - rx + r = 0$ $\alpha + \frac{1}{\alpha} = r$

$\hookrightarrow \alpha^2 - r\alpha + r = 0 \rightarrow \alpha^2 + r = r\alpha$

$\left(\alpha + \frac{r}{\alpha}\right)^2 - r\alpha \cdot \frac{r}{\alpha} = \left(\alpha + \frac{r}{\alpha}\right)^2 - r^2 = \alpha^2 + \frac{r^2}{\alpha^2} + 2r - r^2 = \alpha^2 + \frac{r^2}{\alpha^2} - r^2 + 2r$
 $\frac{\alpha^2 + r}{\alpha} = \frac{r\alpha}{\alpha} = r$

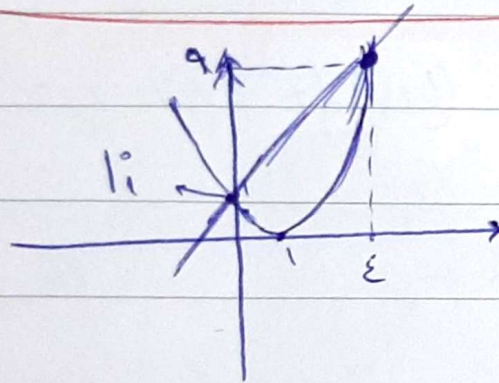
$\frac{\alpha^2 + r}{\alpha} = r \Rightarrow \alpha^2 + r = r\alpha$

$$h_{max} = \frac{-\Delta}{\epsilon_a} = 4 \text{ V, } \Delta$$

9- $h(t) = -10t^2 + \omega_0 t \rightarrow -10t^2 + \omega_0 t \geq 0 \rightarrow h_{max} =$ بفرض در این زمان $\rightarrow -10(t-\Delta) = 0$ } $t = \Delta$ ✓

9 $-10t^2 + \omega_0 t \geq 0 \rightarrow -\frac{\omega_0^2}{40} + \frac{\omega_0}{4} = 1 \text{ V}$

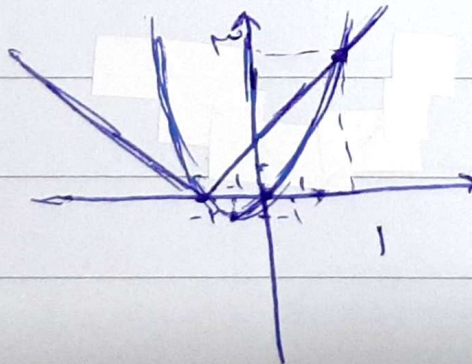
الف) $(n-1)^2 \geq n+1$



$n \geq 0 \rightarrow y \geq 4$
 $n \geq 1 \rightarrow y \geq 1$

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ب) $x^2 + y^2 = |x+y|$



$x \geq 1 \rightarrow y = 3$
 $x \geq -1 \rightarrow y \geq 0$