

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

$$2- \text{a)} f(n) = n^2 + rn + r \rightarrow n^2 = t \Rightarrow t^2 + t + r \rightarrow \Delta < 0 \Rightarrow \text{no real roots}$$

$$\text{b)} f(n) = (f-n^2)^2 - r(f-n^2) - 1 = 0$$

$$\hookrightarrow (f-n^2) = t \Rightarrow t^2 - r t - 1 = 0 \Rightarrow (t-1)(t+r) = 0 \rightarrow \begin{cases} t=1 \rightarrow f-n^2=1 \Rightarrow n^2 = f-1 \rightarrow n = \pm\sqrt{f-1} \\ t=-r \rightarrow f-n^2 = -r \Rightarrow n^2 = f+r \rightarrow n = \pm\sqrt{f+r} \end{cases}$$

$$3- f n^2 - 4n + m = 0 \quad \alpha, \beta \rightarrow \alpha = r + \beta \rightarrow \alpha + \beta = r + \beta + \beta = r + 2\beta = \frac{b}{a} = 4$$

$$\Rightarrow \beta = 1 \Rightarrow \alpha = 3 \Rightarrow \frac{c}{a} = \frac{m}{f} = r \Rightarrow m = 4r$$

$$4- r n^2 - 4n + m - 1 = 0 \quad r\alpha - \beta = 1 \rightarrow \beta = r\alpha - 1$$

$$5 = r\alpha - 1 = r \Rightarrow r\alpha = 6 \Rightarrow \alpha = 2, \beta = 0 \rightarrow \frac{m-1}{r} = 0 \Rightarrow m = 1$$

$$5- -m n^2 + f n + m^2 r = 0 \rightarrow \alpha = \frac{1}{\beta}, r$$

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

$$\hookrightarrow \frac{m^2 - r}{-m} = 1 \Rightarrow m^2 + m - r = 0 \rightarrow (m+r)(m-1) = 0 \rightarrow \begin{cases} m = -r \rightarrow r\beta^2 + f\beta - r = 0 \rightarrow \beta = -1 \\ m = 1 \rightarrow \Delta < 0 \end{cases} \hookrightarrow \alpha = -1$$

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

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

$$\hookrightarrow m = \alpha + \beta = r + 1 \Rightarrow \frac{f r}{1 r} = m$$

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

$$\hookrightarrow r\beta = 5 \Rightarrow \beta = 1$$

$$\hookrightarrow r\beta^2 = m \Rightarrow m = 5$$

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

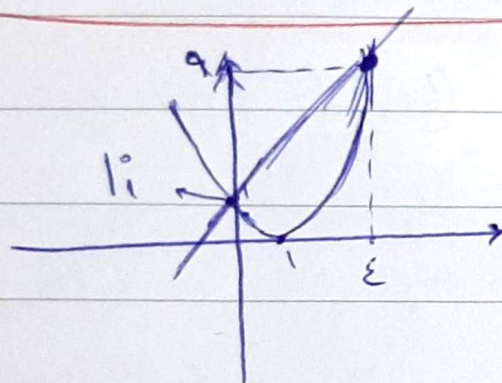
$$\hookrightarrow \alpha^2 - r\alpha + r = 0 \rightarrow \alpha^2 + r = r\alpha$$

$$\left(\alpha + \frac{r}{\alpha}\right)^2 - r\alpha \times \frac{r}{\alpha} \left(\alpha + \frac{r}{\alpha}\right) = \alpha^2 + \frac{1}{\alpha^2} = r^2 - 4r = 0$$

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

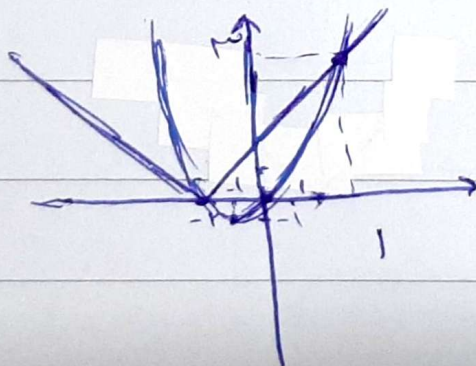
9- $h(t) = -10t^2 + \omega_0 t \rightarrow -10t^2 + \omega_0 t \geq 0 \rightarrow h_{max} =$
 $\hookrightarrow -t^2 + \omega t \geq 0 \rightarrow -\frac{\omega^2}{4} + \frac{\omega^2}{4} = 1 \text{ m/s}$

الف) $(n-1)^2 \geq n+1$



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

ب) $n^2 + n = |n+2|$



$n \geq 1 \rightarrow y = 3$
 $n \geq -2 \rightarrow y \geq 0$