SUBJECT:

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سارینا صفائیانی — بنام او

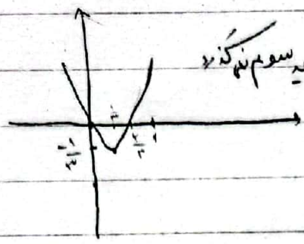
1. الف) $y = 3x^2 - 2x$

$\Delta = 4$ $\quad a > 0 \rightarrow min$

$x = \frac{2 \pm \sqrt{4}}{6} \rightarrow \frac{4}{6} , 0$

$x_s = \frac{-b}{2a} = \frac{2}{6}$

$y_s = 3 \times \frac{1}{36} - 2 \times \frac{2}{6} = -\frac{1}{3}$



از ناحیه سوم نمی‌گذرد

ب) $y = -x^2 + 4x$

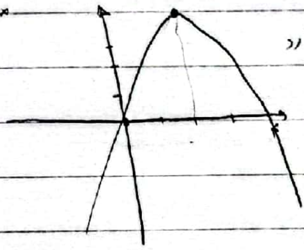
$\Delta = 16$ $\quad a < 0 \rightarrow max$

$x(4 - x) = 0$

$0 \quad 4$

$x_s = \frac{-4}{-2} = 2$

$y_s = 4$



از ناحیه ۲ نمی‌گذرد

2. الف) $y = 2x^2 - 5x + 2$

$a > 0 \rightarrow min$

$x_s = \boxed{\frac{5}{4}}$

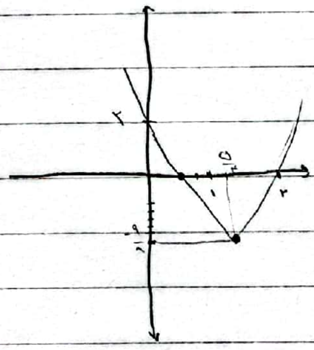
$y_s = 2 \times \frac{25}{16} - 5 \times \frac{5}{4} + 2$

$\frac{25}{8} - \frac{50}{8} + \frac{16}{8} = \boxed{-\frac{9}{8}}$

$x^2 - 5x + 4$

$(x-1)(x-4)$

$\frac{1}{2} \quad \frac{4}{2} = 2$ ریشه‌ها



اول و دوم و چهارم

ب) $y = -x^2 + 4x - 1$

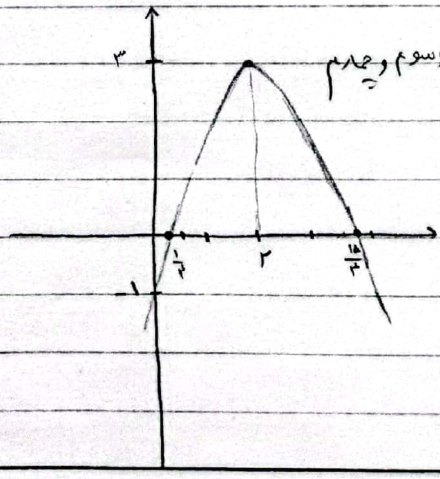
$\Delta = 16 - 4 = 12$ $\quad a < 0 \rightarrow max$

$x = \frac{-4 \pm \sqrt{12}}{-2} \simeq \frac{-4 + 3/5}{-2} , \frac{-4 - 3/5}{-2}$

$\simeq \frac{1}{4} و \frac{15}{4}$

$x_s = \frac{-4}{-2} = 2$

$y_s = -4 + 8 - 1 = 3$



اول و سوم و چهارم

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SUBJECT:

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3- $y = x^2 - x - 3$ مسابقه فایناری

$S = \frac{1}{1} = 1 \quad P = -3$ تفاضل $= \frac{\sqrt{\Delta}}{|a|} = \frac{\sqrt{1-4\times-3}}{|1|} = \sqrt{13}$

الف) $\frac{\alpha+\beta}{\alpha-\beta} = \frac{1}{\sqrt{13}}$

ب) $\alpha^2+\beta^2 = S^2-2P = 1+6 = 7$

ج) $\alpha^3+\beta^3 = S^3-3PS = 1-3\times-3\times1 = 10$

د) $\alpha^3-\beta^3 = (\alpha-\beta)(\alpha^2+\beta^2+\alpha\beta) = \sqrt{13}(7-3) = 4\sqrt{13}$

۴- سارا سیامنظری

$y=(x-2)(x^2-ax+a)$

یا این ریشه نداشته باشد

یا ریشه مضاعف ۲ داشته باشد

$a^2-4a<0$

0		4	
$+$	$-$		$+$

یا $a=4$

$\underline{\cap}$ یا ?

$(0,4]$ ← محدوده a

۵- $2\alpha^2+\beta^2-4\alpha=7$ $\qquad S=\frac{12}{3}=4 \quad 3x^2-12x-a=0$

$2(4\alpha+\frac{a}{3})+4\beta+\frac{a}{3}-4\alpha=7$ $\qquad \alpha^2-4\alpha-\frac{a}{3}=0$

$8\alpha+a+4\beta-4\alpha=7$ $\qquad \alpha^2-4\alpha+3=0 \quad \alpha^2=4\alpha+\frac{a}{3}$

$(\alpha-1)(\alpha-3)=0$

$1 \quad 3$ $\qquad \beta^2=4\beta+\frac{a}{3}$

$4(\alpha+\beta)+a=7$

$16+a=7 \quad a=-9 \qquad \frac{-9}{3}=-3$

۶- $A(2a+3,a-2)$ $\qquad 2a+3\geq1 \quad 2a\geq-2 \quad a\geq-1$

$B(7-2a,a-2)$ $\qquad a-2\geq1 \quad a\geq3$ $\qquad a=3$

$A(9,1)$ $\qquad 7-2a\geq1 \quad 6\geq2a \quad 3\geq a$

$B(1,1)$

$\frac{9+1}{2}=5 \quad x_s=5 \quad \boxed{S(5,3)}$

$y=a(x-x_s)^2+y_s$

$y=a(x-5)^2+3 \qquad y=-\frac{1}{8}(x-5)^2+3$

$1=16a+3 \qquad y=\frac{-25}{8}+\frac{24}{8}$

$-2=16a \qquad a=-\frac{1}{8} \qquad \boxed{y=\frac{-1}{8}}$

۷- $40\beta^2+20\alpha^2-20\beta=17$ $\qquad ax^2-ax-b=0 \quad S=\frac{a}{a}=1$

$40\beta+40\frac{b}{a}+20\alpha+20\frac{b}{a}-20\beta=17$ در صورتی که $a\neq0$ $\quad x^2-x-\frac{b}{a}=0$

$20(\alpha+\beta)+60\frac{b}{a}=17$ $\qquad \alpha^2-\alpha-\frac{b}{a}=0$

$20+60\frac{b}{a}=17$ $\qquad \alpha^2=\alpha+\frac{b}{a}$

$60\frac{b}{a}=-3$ $\qquad \beta^2=\beta+\frac{b}{a}$

$\frac{b}{a}=\frac{-1}{20}$ $\qquad \frac{\sqrt{\Delta}}{|a|}=\frac{\sqrt{a^2-4\times-b\times a}}{|-20b|}=\frac{\sqrt{400b^2-80b^2}}{20b}$

$a=-20b$

s.a.m

$\frac{2\times8\sqrt{2}}{5\times0.4}=\boxed{\frac{2}{5}\sqrt{2}}$

۸- $(-5,\beta)\ (1,\beta)$ مهرسینا صدیقی

$x_s = \frac{-5+1}{2} = -2 \quad y_s = -\frac{1}{2}$

$y = a(x-x_s)^2 + y_s$

$y = a(x+2)^2 - \frac{1}{2} \quad y = \frac{1}{2}(x+2)^2 - \frac{1}{2}$

$\frac{3}{2} = 4a - \frac{1}{2} \quad \beta = y = \frac{9}{2} - \frac{1}{2}$

$2 = 4a \quad a = \frac{1}{2} \quad \underline{\beta = 4}$

۹- $x^2+6x+a=0 \quad \alpha<\beta<0 \quad 3\alpha^2+2\beta^2 = 12\sqrt{2}+85$

$\alpha = \frac{-6 - \sqrt{36-4a}}{2}$

$\alpha^2 + 2(\underbrace{\alpha^2+\beta^2}_{S^2-2P}) = \alpha^2$

$\beta = \frac{-6 + \sqrt{36-4a}}{2}$

$\alpha^2 + 2(36-2a)$

$\frac{36 + 36 - 4a + 12\sqrt{36-4a} + 72 - 4a}{4}$

$S = -6 \quad P = a$

$18 - a + 3\sqrt{36-4a} + 72 - 4a$

$90 - 5a + 3\sqrt{36-4a} = 12\sqrt{2} + 85$

$-5a + 3\sqrt{36-4a} = -5 + 12\sqrt{2}$

if $\boxed{a=1}$

$3\sqrt{36-4} = 12\sqrt{2}$

$\sqrt{32} = \sqrt{32}$ ✓✓

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

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

$\frac{\alpha+\beta}{\alpha\beta} + 2\sqrt{\frac{1}{\alpha\beta}} = 25$

$S = \frac{m+14}{36} \quad \cancel{36}\left(\frac{m+14}{\cancel{36}}\right) + 12 = 25$

$m = -1$

$P = \frac{1}{36}$

$-x^2 + 3x + 2 = 0$

$P_2 = \frac{c}{a} = \frac{2}{-1} = -2$

s.a.m