

$$\begin{aligned}
 \frac{\sqrt{8} + \sqrt{17}}{2 - \sqrt{6}} - 2(\sqrt{9} - 1)^{-1} &= \frac{2\sqrt{2} + 3\sqrt{17}}{2 - \sqrt{6}} - 2 \times \frac{1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1} \quad [2] \quad (126) \\
 &= \frac{2\sqrt{2} + 3\sqrt{17}}{2 - \sqrt{6}} - 2 \times \frac{\sqrt{3} + 1}{\sqrt{3} - 1} = \frac{2\sqrt{2} + 3\sqrt{17}}{2 - \sqrt{6}} \times \frac{2 + \sqrt{6}}{2 + \sqrt{6}} - (\sqrt{3} + 1) \\
 &= \frac{4\sqrt{2} + 2\sqrt{12} + 6\sqrt{17} + 3\sqrt{18}}{14} - (\sqrt{3} + 1) \\
 &= \frac{14\sqrt{2} + 14\sqrt{3}}{14} - \frac{\sqrt{3} + 1}{1} = \frac{14\sqrt{2} + 14\sqrt{3} - 14\sqrt{3} - 14}{14} = \boxed{\sqrt{2} - 1}
 \end{aligned}$$

$92 = 4 \times 23 \Rightarrow$ عدد اول در 92 = 23
 $81 = 3^4$ عدد آخر در 81 = 3
 \Rightarrow اعداد صحیح = $\frac{92 + 81}{2} = \boxed{73}$

$x^2 - 1 = 0$

$\left. \begin{array}{l} \rightarrow x = 1 \\ \rightarrow x = -1 \end{array} \right\}$	$\xrightarrow{\text{فکتوریزه}}$	$\left\{ \begin{array}{l} P(1) = 0 \\ P(-1) = 0 \end{array} \right.$	$[2] \quad (128)$

$x - 2 = 0 \rightarrow x = 2 \rightarrow Q(2) = P(1) + P(-1) = 0$

$$m^2 x^2 + (2m-1)x + 2-m = 0$$

□ (۱۲۹)

$$\alpha + \beta = \frac{1}{\alpha\beta} \Rightarrow \frac{-b}{a} = \frac{c}{a} \Rightarrow a^2 - bc$$

$$\Rightarrow \Delta = - (2m-1)(2-m) \Rightarrow \Delta = -2m + 2m^2 + 2 - m$$

$$\Rightarrow 2m^2 - 3m + 2 = 0 \rightarrow \begin{cases} m = -1 \rightarrow \Delta < 0 \text{ NOT OK} \\ m = \frac{2}{1} \rightarrow \Delta > 0 \text{ OK} \end{cases}$$

$$1 < \frac{x+1}{2x-1} < 3$$

□ (۱۳۰)

Condition $x \neq 1 \rightarrow 1 < 2 < 3 \text{ OK}$
 گزینه ۳ حذف

$(-1, 1) \times$

$(-1, 2) \times$

$(1, 2) \times$

$x = 1/2 \rightarrow 1 < \frac{1.5}{1} < 3 \text{ OK}$
 گزینه ۲ حذف

$(-1, 2) \checkmark$

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

□ (۱۳۱)

$(0, 2) \rightarrow c = 2$

$$\Rightarrow f(x) = 2x^2 + 2x + 2$$

$(-2, 2) \rightarrow 4a - 2b + 2 = 2 \rightarrow b = 2a$

احتمالاً گزینه ۴ صحیح

$(1, 1) \rightarrow a + b + 2 = 1 \Rightarrow 3a = 1$

① گزینه $(-1, 3)$

$a = 1/3, b = 2/3$

OK

$f(x) = \sqrt{x}$ $\xrightarrow{\text{۱۳ و ۱۴، ۱۵ و ۱۶}} g(x) = \sqrt{x-13} + 2$ [3] (۱۳۳)

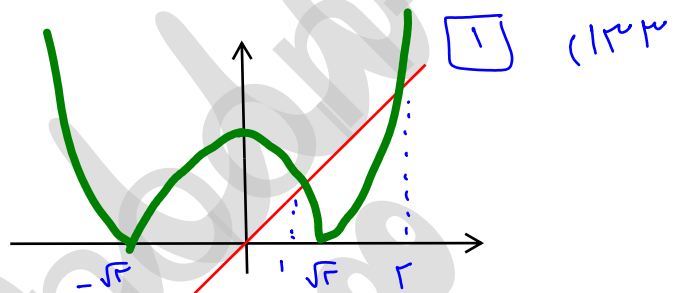
$\xrightarrow{\text{۲ و ۱، ۶ و ۷}}$

مقطع: $\sqrt{x-13} + 2 = \sqrt{x} \xrightarrow{\text{مربع}} x = 14 \Rightarrow y = 2 \rightarrow A(14, 2)$
 محل تلاقی

$|OA| = \sqrt{14^2 + 2^2} = \sqrt{14 \times 14 + 4} = \sqrt{14 \times 16} = 2\sqrt{14}$

$|2x^2 - 4| > 2x$

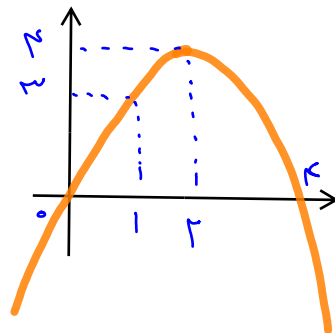
مقطع



$\left\{ \begin{array}{l} 2x^2 - 4 > 2x \rightarrow 2x^2 - 2x - 4 < 0 \rightarrow \begin{cases} x < -1 \\ x > 2 \end{cases} \\ 2x^2 - 4x = -2x \rightarrow 2x^2 + 2x - 4 < 0 \rightarrow \begin{cases} x < -2 \\ x > 1 \end{cases} \end{array} \right. \Rightarrow x \in (1, 2)$
 $a \rightarrow 1, b \rightarrow 2$
 $b - a = 1$

$f(x) = [x - [2x]] \xrightarrow{\text{۱ و ۲، ۳ و ۴}} 0 \leq f(x) < 1$ [2] (۱۳۴)

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



$\Rightarrow 0 \leq g(x) < 4$

$g \circ f = g(f(x))$

$\hookrightarrow [0, 1] \rightarrow \begin{cases} x \leq 0 \rightarrow g = 0 \\ x > 0 \rightarrow g = 4 \end{cases}$
 مورد

$$f(x) = x + \sqrt{x}$$

3 (۱۳۵)

$$g(x) = f^{-1}(x) \Rightarrow \begin{cases} g(9) = f^{-1}(9) \Rightarrow x + \sqrt{x} = 9 \Rightarrow \boxed{x=4} \\ g(12) = f^{-1}(12) \Rightarrow x + \sqrt{x} = 12 \Rightarrow \boxed{x=9} \end{cases}$$

مجموع = (۱۳)

$$f(x) = x - \frac{2}{x}$$

2 (۱۳۶)

مقطع $f^{-1}(x) = -x$ اتصال نموده

$x = \frac{2}{x} \Rightarrow f\left(\frac{2}{x}\right) = -\frac{2}{x}$

$f\left(-\frac{2}{x}\right) = \frac{2}{x} \rightarrow$ درجه ۲
صورت نموده

$x > 1 \Rightarrow f^{-1}(1) = -1$

$f(-1) = 1 \rightarrow$ درجه ۲ صحیح است

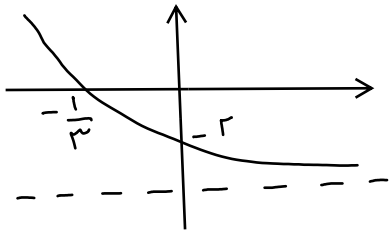
(۱) $\frac{2}{2} = 1$

(۲) $\frac{2}{2} = 1$

(۳) $\frac{2}{2} = 1$

$$\log_{\frac{3}{2}} 3 = 0.18 \Rightarrow \frac{\log 3}{2 \log \frac{3}{2}} = 0.18 \Rightarrow \boxed{\log 3 = 1.16 \log \frac{3}{2}} \quad (۱۳۷)$$

$$\log_{\frac{4}{12}} 4 = \frac{\log 4}{\log 12} = \frac{\log 2 + \log 2}{2 \log 2 + \log 3} = \frac{2 \log 2}{2 \log 2 + \log 3} = \frac{2.9 \log 2}{3.9 \log 2} = \frac{24}{39} \Rightarrow \boxed{\frac{13}{18}}$$



$$f(x) = -r + 2^{ax+b}$$

2) (138)

$$\begin{cases} f(0) = -r \Rightarrow -r + 2^b = -r \rightarrow 2^b = r \rightarrow \boxed{b < 1} \\ f(-\frac{1}{r}) = 0 \Rightarrow -r + 2^{-\frac{a}{r}+b} = 0 \rightarrow 2^{-\frac{a}{r}+b} = r \end{cases}$$

$$\Rightarrow -\frac{a}{r} + 1 = r \rightarrow \boxed{a = -r^2}$$

$$f(-\frac{a}{r}) = -r + 2^4 = \boxed{9}$$

$$f(x) = \frac{r^x + (\frac{1}{r})^x}{r}; x \geq 0$$

1) (139)

$$f^{-1}(r) = ? \Rightarrow f(x) = r \Rightarrow \frac{r^x + r^{-x}}{r} = r \rightarrow r^x + r^{-x} = r^2$$

$$\boxed{r^x = t}$$

$$t + \frac{1}{t} = r \rightarrow t^2 - rt + 1 = 0 \Rightarrow \Delta = r^2$$

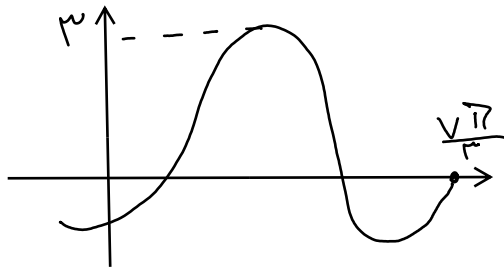
$$\Rightarrow t = \frac{r \pm r\sqrt{r}}{2} \Rightarrow \begin{cases} r^x = \frac{r + r\sqrt{r}}{2} \rightarrow x = \log_r (r + r\sqrt{r}) > 0 \\ r^x = \frac{r - r\sqrt{r}}{2} \rightarrow x = \log_r (r - r\sqrt{r}) < 0 \end{cases}$$

$$\tan(170^\circ) \cos(210^\circ) + \tan(170^\circ) \sin(170^\circ) = ?$$

2) (140)

$$\begin{matrix} \downarrow & \downarrow & \downarrow & \downarrow \\ 170^\circ + 30^\circ & 110^\circ + 30^\circ & 170^\circ + 30^\circ & 110^\circ + 30^\circ \\ \downarrow & & & \\ (-\cot 30^\circ) & (-\cos 30^\circ) & (-\cot 30^\circ) & (\cos 30^\circ) \end{matrix}$$

$$= (-\cot 30^\circ)(-\cos 30^\circ) + (-\cot 30^\circ)(\cos 30^\circ) = 0$$



$$f(x) = a + b \sin\left(\frac{x}{T} + \phi\right) \quad (141)$$

↓

4

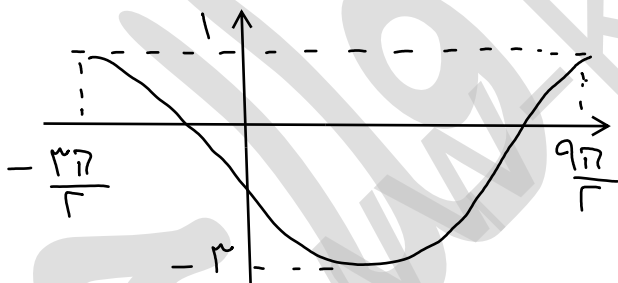
$$f(x) = a + b \cos x$$

$$\Rightarrow \begin{cases} \max f = 3 \Rightarrow |b| + a = 3 \xrightarrow{\text{مقدور شیب منفی}} -b + a = 3 \\ b < 0 \end{cases}$$

$$f\left(\frac{\pi}{2}\right) = 0 \Rightarrow a + b \cos\left(\frac{\pi}{2}\right) = 0$$

$$\Rightarrow a + b \cos\left(\frac{\pi}{2}\right) = 0 \Rightarrow a + \frac{b}{T} = 0$$

$$\Rightarrow \begin{cases} a - b = 3 \\ a + \frac{b}{T} = 0 \end{cases} \xrightarrow{\text{منها}} \frac{b}{T} = -3 \Rightarrow \boxed{b = -3T}$$



$$f(x) = a \sin bx + c \quad (142)$$

4

چون نزول شیب منفی پس $a < 0$
 $b > 0$

$$\begin{cases} \max = |a| + c = 1 \\ \min = -|a| + c = -3 \end{cases} \xrightarrow{\text{جمع}} 2c = -2 \Rightarrow \boxed{c = -1}$$

$$\Rightarrow |a| = 2 \xrightarrow{a < 0} \boxed{a = -2}$$

$$T = \frac{2\pi}{|b|} = 4\pi \Rightarrow |b| = \frac{1}{2} \xrightarrow{b > 0} \boxed{b = \frac{1}{2}}$$

$$\frac{a}{b} = \boxed{-4}$$

$$\sin\left(2x - \frac{\pi}{4}\right) = \cos\left(x + \frac{\pi}{4}\right), \quad x \neq k\pi \quad (143)$$

4

$$\sin\left(2x - \frac{\pi}{4}\right) = \cos\left(x + \frac{\pi}{4} + \frac{\pi}{4} - \frac{\pi}{4}\right)$$

$$\sin\left(2x - \frac{\pi}{4}\right) = \cos\left(x - \frac{\pi}{4} + \frac{\pi}{4}\right)$$

$$\sin\left(2x - \frac{\pi}{4}\right) = -\sin\left(x - \frac{\pi}{4}\right) \Rightarrow \sin\left(2x - \frac{\pi}{4}\right) = \sin\left(\frac{\pi}{4} - x\right)$$

$$\Rightarrow \begin{cases} 2x - \frac{\pi}{4} = 2k\pi + \frac{\pi}{4} - x \Rightarrow 3x = 2k\pi + \frac{\pi}{2} \Rightarrow x = \frac{2k\pi}{3} + \frac{\pi}{6} \\ 2x - \frac{\pi}{4} = 2k\pi + \pi - \frac{\pi}{4} + x \Rightarrow x = 2k\pi + \pi \end{cases}$$

$$\lim_{x \rightarrow -2} \frac{[x] + 2}{x + 2} = \frac{-2 + 2}{0^-} = \frac{0}{0^-} = 0 \quad (144)$$

3

$$\lim_{x \rightarrow \infty} \frac{ax - \sqrt{x^2 - 1}}{x^n - 1} \xrightarrow{\text{L'Hôpital}} \frac{ax}{x^n} = \frac{1}{9} \Rightarrow \begin{cases} n = 1 \\ a = \frac{1}{9} \end{cases} \quad (145)$$

1

$$\lim_{x \rightarrow 2} \frac{\frac{1}{9}x - \sqrt{x^2 - 1}}{x - 1} = \frac{0}{0} \xrightarrow{\text{H.P}} \lim_{x \rightarrow 2} \frac{\frac{1}{9} - \frac{2x}{2\sqrt{x^2 - 1}}}{1} = \frac{1}{9} - \frac{1}{12}$$

$$= \frac{4 - 3}{36} = \frac{1}{36}$$

$$f(x) = \begin{cases} \sqrt{a-2x} & ; x \leq -1 \\ -\frac{1}{\mu}x + b & ; x > -1 \end{cases} \Rightarrow f'(x) = \begin{cases} \frac{-1}{\sqrt{a-2x}} & ; x \leq -1 \quad (144) \\ -x + b & ; x > -1 \end{cases} \quad [3]$$

$$\begin{cases} f(-1) = f(-1) \Rightarrow \sqrt{a-2(-1)} = -\frac{1}{\mu}(-1) + b \Rightarrow \sqrt{a+2} = \frac{1}{\mu} + b \\ f'(-1) = f'(-1) \Rightarrow \frac{-1}{\sqrt{a+2}} = -(-1) + b \Rightarrow \frac{-1}{\sqrt{a+2}} = 1 + b \Rightarrow b = \frac{-1}{\sqrt{a+2}} - 1 \end{cases}$$

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

$$f'(x) = \mu \times \left(\frac{\sqrt{x^2+2x}}{x^2-x} \right)' \times \frac{\frac{2x+2}{\sqrt{x^2+2x}} \times (x^2-x) - (\sqrt{x^2+2x}) \times 2x}{(x^2-x)^2} \quad (145) \quad [4]$$

$$f'(1) = \mu \times \left(\frac{1}{1} \right)' \times \frac{\frac{4}{1} \times 1 - \mu \times 1}{1} = \mu \times \frac{-1}{1} = -1$$

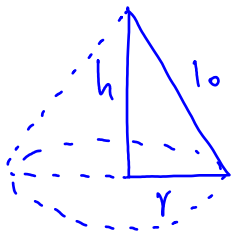
$$f(x) = x + \sqrt{kx - x^2} \Rightarrow f'(x) = 1 + \frac{k-2x}{2\sqrt{kx-x^2}} = \frac{2\sqrt{kx-x^2} + k-2x}{2\sqrt{kx-x^2}} \quad (146) \quad [3]$$

$$\Rightarrow \sqrt{kx-x^2} = x-1 \Rightarrow kx-x^2 = x^2-2x+1 \Rightarrow 2x^2-1x+1=0$$

$$\Rightarrow x^2 - \frac{1}{2}x + \frac{1}{2} = 0 \Rightarrow \Delta < 0 \Rightarrow x = \frac{1 \pm \sqrt{1-2}}{2} \Rightarrow \begin{cases} x_1 = \frac{1+\sqrt{-1}}{2} \\ x_2 = \frac{1-\sqrt{-1}}{2} \end{cases}$$

$x \mid 0 \quad 1-\sqrt{1} \quad 1+\sqrt{1} \quad 1$
 $y \mid \text{shaded} \quad - \quad + \quad - \quad \text{shaded}$
max

$$\Rightarrow \begin{cases} f(1+\sqrt{1}) = 1 + 1\sqrt{1} \\ y = x \rightarrow x - y = 0 \end{cases} \Rightarrow \text{max} = \frac{|1+\sqrt{1} - 1\sqrt{1}|}{\sqrt{1}} = \frac{\sqrt{1}}{\sqrt{1}} = 1 \quad (=1)$$



$$r^2 + h^2 = 100 \rightarrow r^2 = 100 - h^2$$

(۱۴۹)

(۴)

$$V = \frac{\pi}{3} r^2 h = \frac{\pi}{3} (100h - h^3)$$

$$V' = \frac{\pi}{3} (100 - 3h^2) = 0 \rightarrow h^2 = \frac{100}{3} \rightarrow r = \frac{r}{\sqrt{3}}$$

$$\frac{h}{r} = \frac{\frac{10}{\sqrt{3}}}{\frac{10}{\sqrt{3}}} = \left(\frac{1}{\sqrt{3}}\right) \rightarrow \frac{r}{h} = \left(\frac{\sqrt{3}}{1}\right)$$

(متغیری انتخاب شود) \subset (حاصل کردیم انتخاب نبرد)

(۱۵۰) [3]

$$\begin{pmatrix} 5 \\ 2 \end{pmatrix} \begin{pmatrix} 2 \\ 0 \end{pmatrix} + \begin{pmatrix} 5 \\ 2 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \end{pmatrix} = \frac{5 \times 2}{2} + \frac{5 \times 2 \times 1}{2 \times 2} \times 2$$

$$= 10 + 10 = 20$$

$$P(A) = \frac{3! \times 2! \times 2!}{4!} = \frac{\cancel{3 \times 2 \times 1} \times \cancel{2 \times 1} \times \cancel{2 \times 1}}{4 \times 3 \times 2 \times 1} = \left(\frac{1}{24}\right)$$

[3]

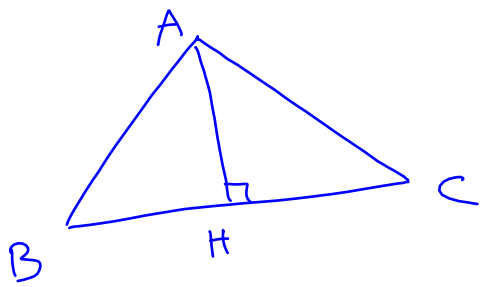
x_i	۱۰	۱۱	۱۴
فردآوری	۵	۴	۵

$n=14$

$$\Rightarrow \bar{X} = \frac{5 \times 10 + 4 \times 11 + 5 \times 14}{14} = 12$$

$$s^2 = \frac{5 \times (10-12)^2 + 4 \times (11-12)^2 + 5 \times (14-12)^2}{14} = \frac{5 \times 4 + 4 \times 1 + 5 \times 4}{14} = \frac{36}{14} = \frac{18}{7}$$

$$C.V = \frac{\sqrt{s^2}}{\bar{X}} = \frac{\sqrt{\frac{18}{7}}}{12} = \frac{\frac{\sqrt{18}}{\sqrt{7}}}{12} = \frac{\sqrt{18}}{12\sqrt{7}} = \frac{3\sqrt{2}}{4\sqrt{7}} = \frac{3\sqrt{14}}{28} = \left(\frac{3\sqrt{14}}{28}\right)$$



$$B(7, 3)$$

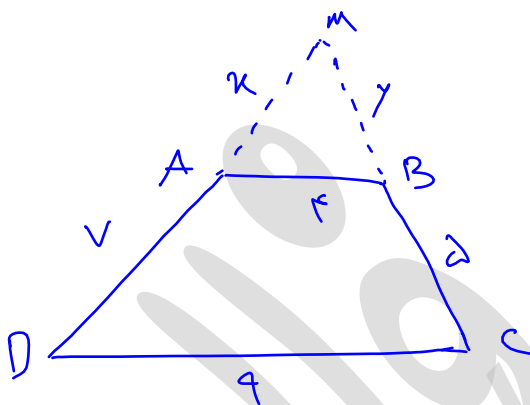
$$C(2, -2)$$

$$\Rightarrow m_{BC} = \frac{2}{5} = 1$$

4 (153)

$$\xrightarrow{BC \text{ معادله}} y - 3 = 1(x - 7) \Rightarrow x - y - 4 = 0$$

$$A(1, 5) \Rightarrow \text{فاصله} = \frac{|1 - 5 - 4|}{\sqrt{1+1}} = \frac{1}{\sqrt{2}} = \frac{1\sqrt{2}}{2} = \frac{\sqrt{2}}{2}$$



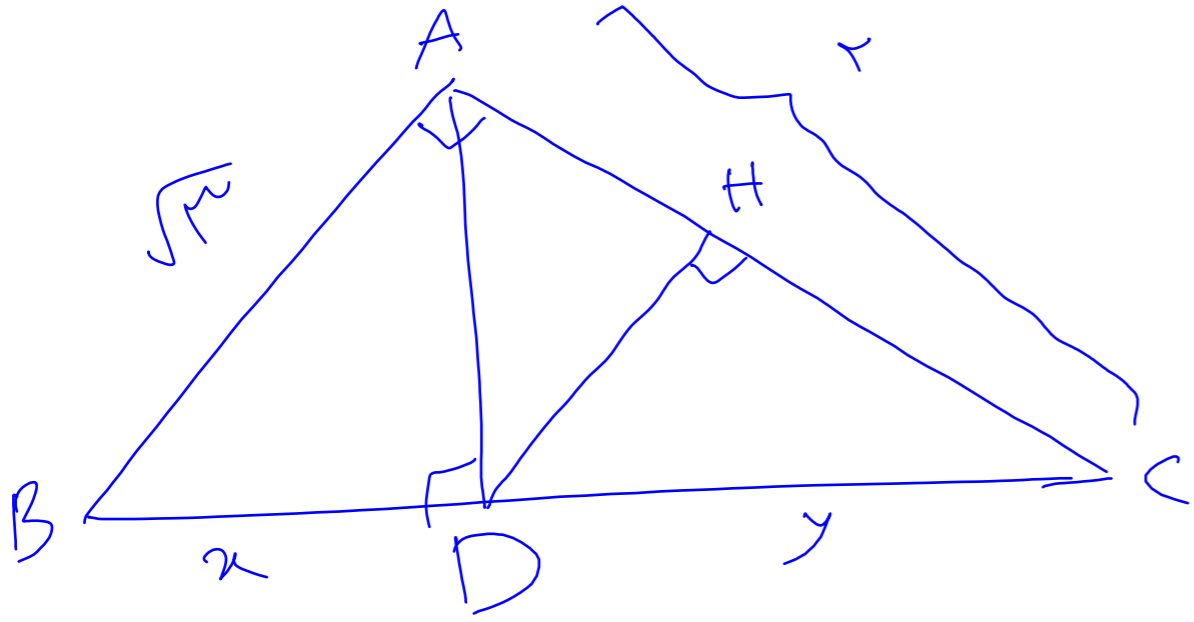
$$\text{تساوی} \quad \frac{x}{x+v} = \frac{y}{y+d} = \frac{r}{a}$$

2 (154)

$$\Rightarrow \begin{cases} 4x = 4x + 2a \rightarrow x = \frac{2a}{2} = a \\ 9y = 4y + 2a \rightarrow y = 2a \end{cases}$$

$$\Delta_{MAB} \text{ مساحت} = x + y + r = a + 2a + a = 4a = 12 \Rightarrow a = 3$$

۱۵۵ (4)



$$\Delta ABC \xrightarrow{\text{قضیه فیثاغورس}} (BC)^2 = AB^2 + AC^2 = 3 + 4 = 7 \Rightarrow BC = \sqrt{7}$$

$$\sin \hat{B} = \frac{AC}{BC} \Rightarrow \sin \hat{B} = \frac{2}{\sqrt{7}}, \quad \hat{B} + \hat{C} = 90^\circ \xrightarrow{\text{مستقيم}} \hat{C} = 90^\circ - \hat{B} \Rightarrow \sin \hat{C} = \frac{2}{\sqrt{7}}$$

$$\sin \hat{B} = \frac{AD}{AB} \Rightarrow \frac{AD}{\sqrt{3}} = \frac{2}{\sqrt{7}} \Rightarrow AD = \frac{2\sqrt{3}}{\sqrt{7}}$$

$$\Delta ABD \xrightarrow{\text{قضیه فیثاغورس}} x^2 = AB^2 - AD^2 = 3 - \frac{12}{7} = \frac{9}{7} \Rightarrow x = \frac{3}{\sqrt{7}} = \frac{\sqrt{3}}{\sqrt{7}}$$

$$\Rightarrow y = \frac{4}{\sqrt{7}}$$

$$\cos \hat{C} = \frac{CH}{y} = \frac{2}{\sqrt{7}} \Rightarrow CH = \frac{1}{\sqrt{7}}$$

$$S_{ABD} = \frac{1}{2} \times \sqrt{3} \times \frac{2\sqrt{3}}{\sqrt{7}} \times \sin \hat{B} = \frac{1}{2} \times \sqrt{3} \times \frac{2\sqrt{3}}{\sqrt{7}} \times \frac{2}{\sqrt{7}} = \frac{6\sqrt{3}}{7}$$

$$S_{CHD} = \frac{1}{2} \times \frac{1}{\sqrt{7}} \times \frac{4}{\sqrt{7}} \times \sin \hat{C} = \frac{1}{2} \times \frac{1}{\sqrt{7}} \times \frac{4}{\sqrt{7}} \times \frac{2}{\sqrt{7}} = \frac{4\sqrt{3}}{49}$$

$$\text{نسبت مساحت} = \frac{\frac{6\sqrt{3}}{7}}{\frac{4\sqrt{3}}{49}} = \frac{6\sqrt{3} \times 49}{7 \times 4\sqrt{3}} = \frac{147}{14} = \frac{10.5}{1}$$