

آمار:

میانگین
Average - mean

$$\frac{\sum x_i}{n_t} \leftarrow \frac{\text{مجموع}}{\text{تعداد}}$$

که اگر به ترتیب از کوچک به بزرگ بنویسیم، عدد وسط

میان
median

میان
1 3 7
1 3 5 10

اگر عدد زوج باشد، میانگین دو عدد وسط

واریانس ← معیار برای نشان دادن پراکندگی از میانگین است. هر چه پراکندگی بیشتر باشد، واریانس بیشتر است

1 2 3 → V_1
5 2 4 → V_2

→ $V_2 > V_1$

هر چه تعداد از میانگین دور باشد واریانس بیشتر است

Among the four following data sets

~~X~~ = $\{-1, 0, 1\}$, 

~~T~~ = $\{-2, 0, 2\}$, 

~~X~~ = $\{-1, 0, 2\}$, 

Y = $\{-2, 1, 2\}$, 

which one has the greatest variance?

☐ A. X and Y

☒ B. Y

☐ C. T

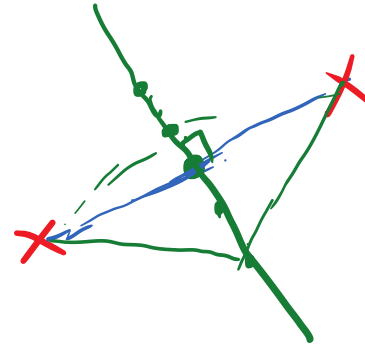
☐ D. S

☐ E. X



In the plane, the locus of points with the same distance from two given distinct points is

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- ☐ A. two perpendicular lines
- ☐ B. an oval
- ☐ C. one or two lines, depending on the position of the two points
- ☒ D. a line
- ☐ E. an ellipse

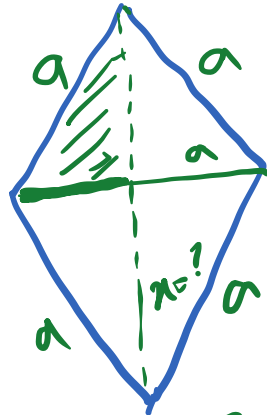
If a rhombus has a diagonal equal to the side, the other diagonal is

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دلخواه

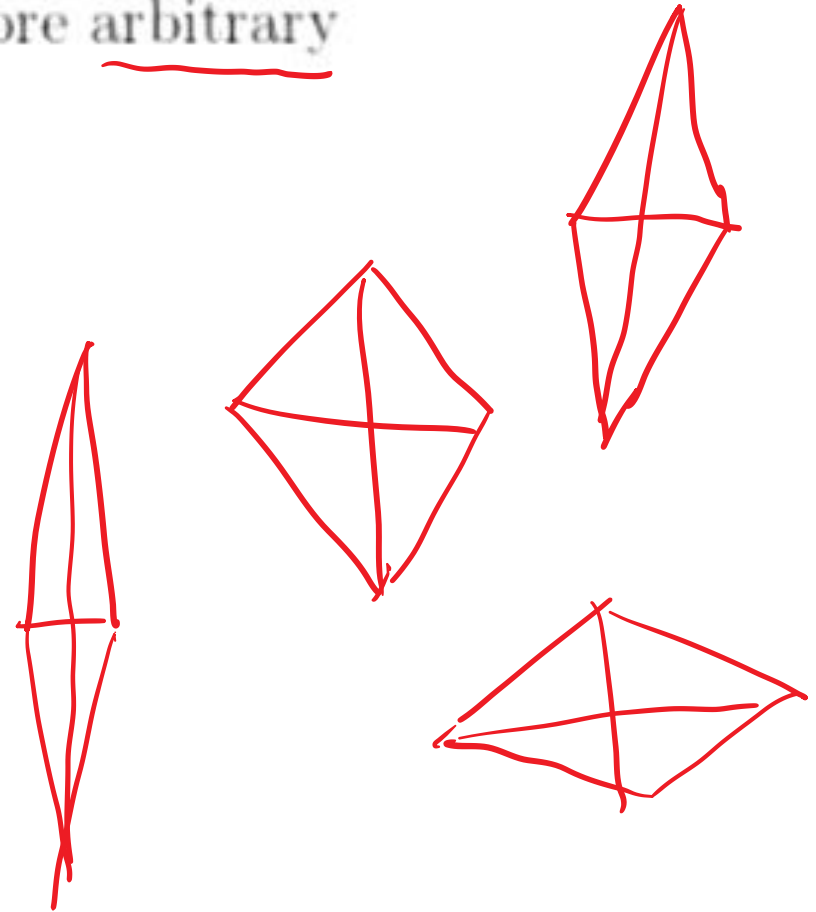
- ☐ A. independent of the previous data and therefore arbitrary
- ☐ B. $\sqrt{2}$ times the side
- ☐ C. the double of the side
- ☐ D. equal to the side
- ☒ E. $\sqrt{3}$ times the side

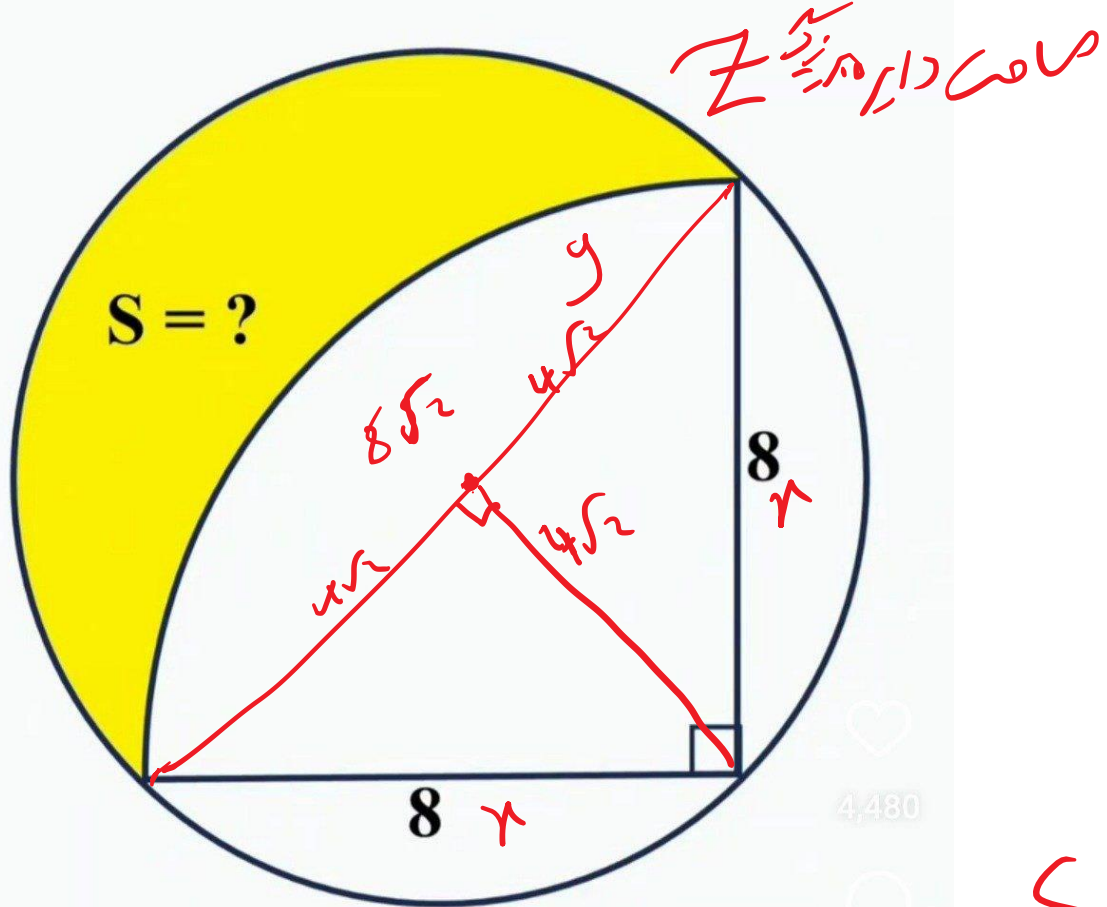


$$a^2 = \left(\frac{a}{2}\right)^2 + \left(\frac{x}{2}\right)^2$$

$$4a^2 - a^2 = \frac{x^2}{4}$$

$$3\frac{a^2}{4} = \frac{x^2}{4} \rightarrow x = a\sqrt{3}$$





$$Z = \pi (4\sqrt{2})^2 = 32\pi$$

$$y = \frac{1}{4} \pi \times 8^2 = 16\pi$$

$$x = \frac{Z}{4} - \frac{4\sqrt{2} \times 4\sqrt{2}}{2} = 8\pi - 16$$

$$S = Z - y - \overbrace{x - r}^{-2r} = 32\pi - 16\pi - 2(8\pi - 16)$$

$$S = \cancel{16\pi} - \cancel{16\pi} + 32 = \boxed{32}$$

$$\sqrt{\sqrt{9} - \sqrt{8}}$$

$$1) \sqrt{3} - \sqrt{2}$$

$$\checkmark 2) \sqrt{2} - 1$$

$$3) 2 - \sqrt{2}$$

$$4) \sqrt{5} - \sqrt{3}$$

$$5) 2\sqrt{5} - 3\sqrt{2}$$

$$\begin{aligned} \sqrt{\sqrt{9} - \sqrt{8}} &= \sqrt{3 - 2\sqrt{2}} = \sqrt{2 + 1 - 2\sqrt{2}} = \sqrt{(\sqrt{2})^2 - 2\sqrt{2} + 1^2} = \sqrt{(\sqrt{2} - 1)^2} = \sqrt[4]{(\sqrt{2} - 1)^2} \\ &= \sqrt{2} - 1 \end{aligned}$$

The numbers ($k = 0, \pm 1, \pm 2, \dots$)

$$x = \pm \frac{\pi}{2} + 2k\pi$$

are solutions of one of the following equations. Which one?

$$x = \frac{\pi}{2}$$

- ☐ ~~A.~~ $\cos x + \cos 2x = 0$
- ☐ ~~B.~~ $\tan 2x = 3 \tan x$
- ☐ ~~C.~~ $\sin x + \sin 2x = 0$
- ☐ ~~D.~~ $\cot 2x = 1 + \cot x$
- ☒ E. $\sin 2x - \cos x = 0$

$$\begin{aligned}\cos \frac{\pi}{2} + \cos \pi &= 0 - 1 = -1 \\ \tan \pi &= 3 \tan \frac{\pi}{2} \rightarrow \infty \\ \sin \frac{\pi}{2} + \sin \pi &= 1 + 0 = 1 \\ \cot \pi &\rightarrow \infty\end{aligned}$$

The average daily sales of drinks in a certain bar are shown in the following table.

Type	Average number of sales
Coffee	60
tea	25
cappuccino	30
soft drinks	40
juice	20
sodas	25

$$\checkmark = 200 \xrightarrow{0.25} 50$$

The bar manager decides to increase the price of drinks whose average daily sales exceed 25% of the total. Which drinks increase in price?

- ☐ A. No drink
- ☐ B. All drinks, but for juices
- ☐ C. Coffee, cappuccino, soft drinks
- ☒ D. Coffee only
- ☐ E. All drinks

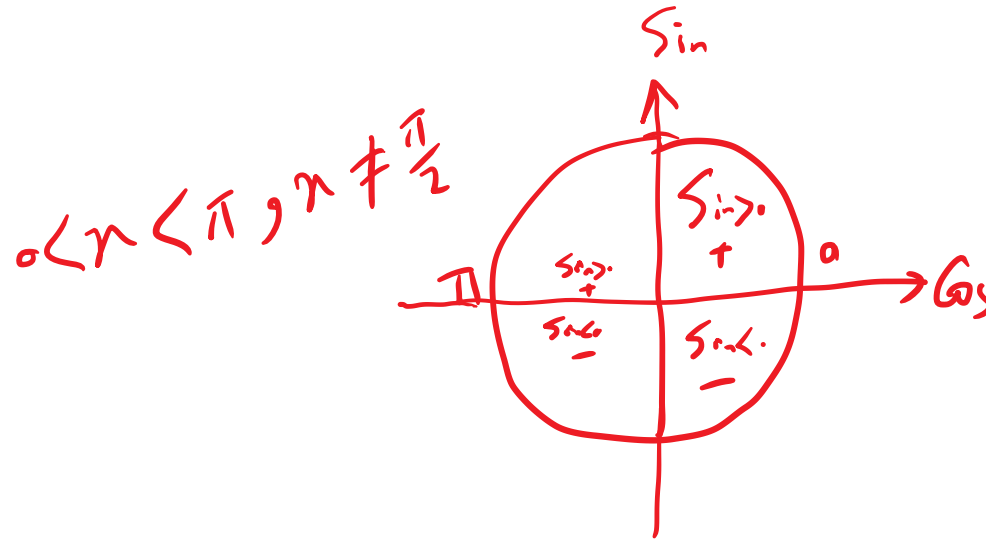
If a real number x , with $0 \leq x \leq 2\pi$, satisfies the inequality

$$(1 - \sin x) \sin x > 0$$

then

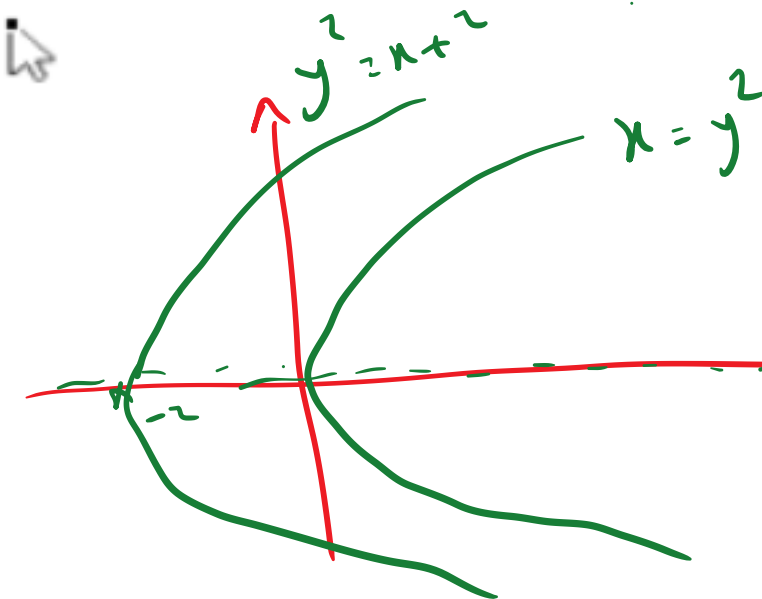
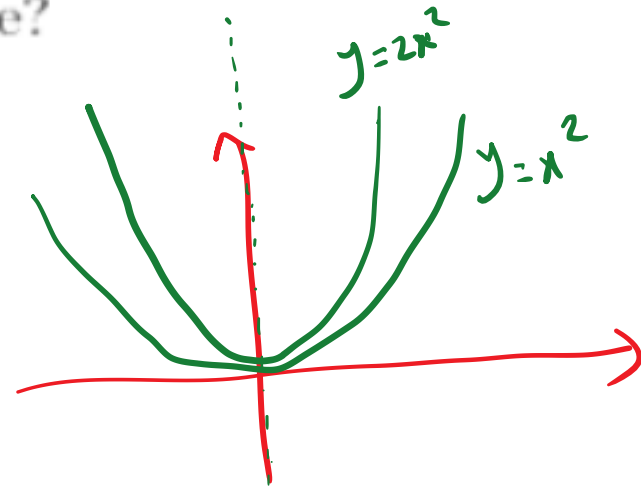
$$\sin x \leq 1 \rightarrow 1 - \sin x \geq 0 \rightarrow x = \frac{\pi}{2} \text{ حذف}$$

- ☐ A. $x = \pi/2$
- ☐ B. $0 < x < \pi$
- ☐ C. $0 \leq x \leq \pi$
- ☐ D. $0 < x < \pi/2$
- ☒ E. $0 < x < \pi, x \neq \pi/2$

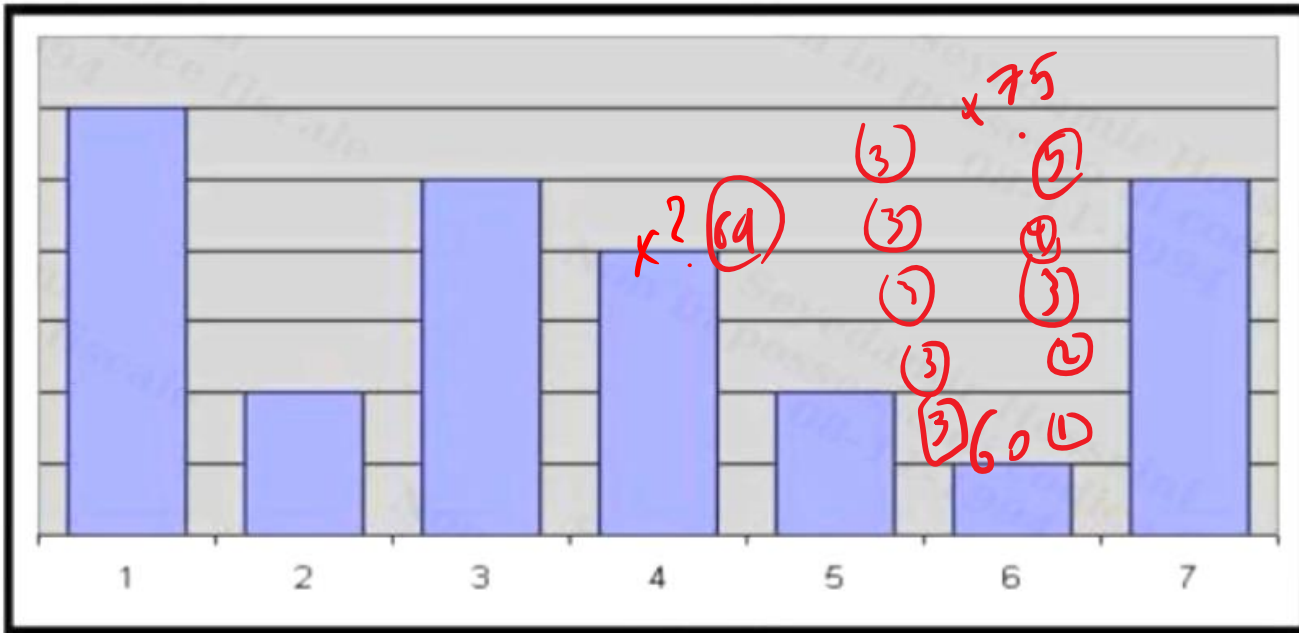


In the Cartesian plane, only one of the following equations represents a parabola with the axis parallel to the x axis. Which one?

- ☐ A. $x^2 + 2xy + y^2 - x = 1$
- ☐ B. $x^2 - 2xy = 1$
- ☒ C. $y^2 = x + 2$
- ☐ D. $y = 3x - 1$
- ☐ E. $y = 2x^2$



In the histogram in the figure the minimum value is 60 units and the maximum value is 75 units. How much is the value number 4?



$$75 - 60 = 15$$

$$\frac{15}{5} = 3$$

- ☒ A. 69 units
- ☐ B. 66 units
- ☐ C. 72 units
- ☐ D. 71 units
- ☐ E. 70 units

Let α be the measure in radians of an angle, with $\frac{\pi}{2} < \alpha < \pi$. If

$$\cos \alpha = -\frac{1}{4}$$

then

$$\sin\left(\alpha + \frac{\pi}{4}\right) = \sin \alpha \cos \frac{\pi}{4} + \sin \frac{\pi}{4} \cos \alpha$$

is equal to

- ☐ A. $\frac{-1 - \sqrt{15}}{4\sqrt{2}}$
- ☐ B. $-\frac{3}{4}$
- ☐ C. $\frac{1 - \sqrt{15}}{4\sqrt{2}}$
- ☐ D. $\frac{1 + \sqrt{15}}{4\sqrt{2}}$
- ☒ E. $\frac{-1 + \sqrt{15}}{4\sqrt{2}}$

$$= \frac{\sqrt{15}}{4} \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} \left(-\frac{1}{4}\right)$$

$$\frac{\sqrt{15}}{4} \times \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}} \times \frac{1}{4}$$

$$\frac{\sqrt{15} - 1}{4\sqrt{2}}$$

$$\sin(a+b) = \sin a \cos b + \sin b \cos a$$

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

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

$$\sin^2 \alpha + \frac{1}{16} = 1 \rightarrow \sin^2 \alpha = 1 - \frac{1}{16} = \frac{15}{16}$$

$$\boxed{\sin \alpha = \frac{\sqrt{15}}{4}}$$

$$\sin \alpha = -\frac{\sqrt{15}}{4} \quad \times$$

$$\frac{\pi}{2} < \alpha < \pi \quad \sin \alpha > 0$$