

1.

א. נסתכל על $\triangle ACB$

$$\tan 73^\circ = \frac{AC}{BC}$$

$$AC = 2a \tan 73$$

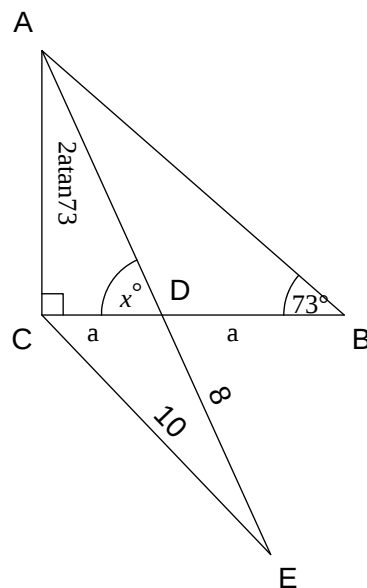
$\triangle ACD$

$$\angle ADC = x$$

$$\frac{AC}{DC} = \tan x$$

$$\frac{2a \cdot \tan 73}{a} = \tan x$$

$$x = 81.31$$



ב.

$\triangle CDE$

$$\angle CDE = 180^\circ - x^\circ = 180^\circ - 81.31^\circ = 98.7^\circ$$

$$CE^2 = CD^2 + DE^2 - 2CD \cdot DE \cdot \cos \angle CDE$$

$$100 = a^2 + 64 - 16a \cdot \cos 98.7$$

$$36 = a^2 - 2.42a$$

$$a^2 - 2.42a - 36 = 0$$

$$a_{1,2} = \frac{2.42 \pm \sqrt{5.85 + 144}}{2} = \frac{2.42 \pm 12.24}{2}$$

$$BC = 9.824 \text{ מ"מ}$$

2.

א.

$$3 - b \sin 90 = -3$$

$$3 - b = -3$$

$$\boxed{b = 6}$$

ב.

$$y = \int (3 - 6 \sin 3x) dx = 3x - \frac{6(-\cos 3x)}{3} + C$$

$$y = 3x + \frac{6 \cos 3x}{3} + C$$

נציב $x = \frac{\pi}{6}$ במשוואת המשיק $y = -3x + 2\pi$:

$$y = \frac{3\pi}{6} + 2\pi = 1.5\pi$$

$$y = 1.5\pi$$

נציב $x = \frac{\pi}{6}$ ו- $y = 1.5\pi$

$$1.5\pi = 3 \frac{\pi}{6} + \frac{6 \cos 3 \frac{\pi}{6}}{3} + C$$

$$1.5\pi = \frac{\pi}{2} + C$$

$$\pi = C$$

$$y = 3x + 2 \cos 3x + \pi$$

ג.

$$y' = 3 - 6 \sin 3x = 0$$

$$\sin 3x = \frac{1}{2}$$

$$3x = 30^\circ + 360^\circ k$$

$$3x = 150^\circ + 360^\circ k$$

$$x = 10^\circ + 120^\circ k$$

$$x = 50^\circ + 120^\circ k$$

max

min

$$x = 10^\circ = \frac{\pi}{18}$$

$$x = 50^\circ = \frac{5\pi}{18}$$

$$y'' = -18 \cos 3x$$

$$y''\left(\frac{\pi}{18}\right) < 0 \Rightarrow \max, y''\left(\frac{5\pi}{18}\right) > 0 \Rightarrow \min$$

$$\boxed{x = \frac{\pi}{18} \max, x = \frac{5\pi}{18} \min}$$

3. נשתמש בנוסחה $na^x = y$
א.

$$n = n$$

$$a = ?$$

$$x = 4$$

$$y = 0.6n$$

$$na^4 = 0.6n$$

$$a^4 = 0.6$$

$$a = 0.88011$$

$$0.88 = 1 - \frac{p}{100} \rightarrow p = 12\%$$

ב. המגרש עלה כל שנה פי $12 \cdot 1.5 = 18\%$

$$a = 1 + \frac{p}{100} = 1 + \frac{18}{100} = 1.18$$

$$x = ?$$

$$y = 1.4n$$

$$N_2 = 0.6N$$

$$0.6n \cdot 1.18^x = 1.4n$$

$$1.18^x = 2\frac{1}{3}$$

$$x = \frac{\ln 2\frac{1}{3}}{\ln 1.18} = 5.119 \text{ שנים}$$

4.

$$f(x) = (\log_2 x)^2 - \log_4 x^2$$

א.

$$x > 0$$

ב.

$$0 = (\log_2 x)^2 - \frac{2 \log_2 x}{\log_2 4}$$

$$t^2 - t = 0$$

$$t = 0$$

$$t = 1$$

$$\log_2 x = 0$$

$$\log_2 x = 1$$

$$x = 1, (1, 0)$$

$$x = 2, (2, 0)$$

תשובה: $(1, 0), (2, 0)$

ג.

$$y' = 2 \log_2 x \cdot \frac{1}{x \ln 2} - \frac{2}{x \ln 2} = \frac{2 \log_2 x - 2}{x \ln 2}$$

$$y' = 2 \log_2 x \cdot \frac{1}{x \ln 2} - \frac{1}{x \ln 2}$$

$$m = 2 \log_2 \sqrt{2} \cdot \frac{1}{\sqrt{2} \ln 2} - \frac{1}{\sqrt{2} \ln 2} = \frac{2 \cdot \left(-\frac{1}{2}\right)}{\sqrt{2} \ln 2} - \frac{1}{\sqrt{2} \ln 2}$$

$$m = 0$$

$$y = (\log_2 \sqrt{2})^2 - \log_4 \sqrt{2}^2 = \left(-\frac{1}{2}\right)^2 - \frac{1}{2} = \frac{-1}{4}$$

$$y - y_1 = m(x - x_1)$$

$$y - \frac{1}{4} = 0(x - \sqrt{2})$$

$$y = -\frac{1}{4}$$

5.
א.

$$f'(x) = \frac{1}{2} e^{\frac{x+1}{2}} = \frac{e^2}{2}$$

$$\frac{1}{2} e^{\frac{x+1}{2}} = \frac{e^2}{2} \Rightarrow e^{\frac{x+1}{2}} = e^2 \Rightarrow \frac{x+1}{2} = 2 \Rightarrow x+1 = 4$$

$$x = 3 \rightarrow y = e^{\frac{3+1}{2}} \rightarrow (3, e^2)$$

$$m = \frac{1}{2} e^2$$

$$y - e^2 = \frac{e^2}{2} (x - 3)$$

$$\boxed{y = \frac{1}{2} e^2 x - \frac{1}{2} e^2}$$

ב.

$$\int_0^3 \left[e^{\frac{x+1}{2}} + \frac{1}{2} e^2 x + \frac{1}{2} e^2 \right] dx =$$

$$= \frac{e^{\frac{x+1}{2}}}{0.5} - - \frac{1}{2} e^2 \frac{x^2}{2} + \frac{1}{2} e^2 x \Bigg|_0^3 =$$

$$= \left(2e^2 - 2.25e^2 + \frac{1}{2} e^2 \cdot 3 \right) - \left(\frac{e^{\frac{1}{2}}}{0.5} \right) =$$

$$= \boxed{\left(1.25e^2 - 2\sqrt{e} = 5.93 \right)}$$

$$\boxed{S = 5.93}$$