

I (2,5)

שאלה 2: נתון: $a(t) = 12t^2$ מ/ש², $v(0) = 0$ מ/ש, $x(0) = 0$ מ. מצא: $v(t)$ ו- $x(t)$.

II (2,5)

$x_0 = 0$ מ

$v_0 = 0$

$a = 12t^2$ מ/ש²

$x_t = ?$

$a = \frac{dv}{dt}, v = \frac{dx}{dt}$

$a = \frac{dv}{dt} \Rightarrow \int a dt = \int dv$

$\Rightarrow v_t = \int_0^t 12t^2 dt = \int_0^t t^2 dt = \left[\frac{t^3}{3} \right]_0^t = \frac{t^3}{3} - \frac{0^3}{3} = \frac{t^3}{3}$

$v(t) = \int a dt = \int t^2 dt = \frac{t^3}{3} + C$
(v_0)

$v = \frac{dx}{dt} \Rightarrow dx = v dt = \int \frac{t^3}{3} dt = \frac{t^4}{12} + C$

$\Rightarrow x = \int_0^t \frac{t^3}{3} dt = \left[\frac{t^4}{12} \right]_0^t = \frac{t^4}{12} - \frac{0^4}{12} = \frac{10000}{12} = \frac{2500}{3} = 833\frac{1}{3} \text{ m}$

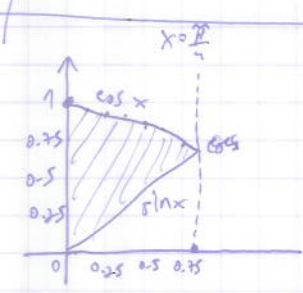
5) $W = \int f(x) dx$ (אנרגיה) (אנרגיה) (אנרגיה) (אנרגיה)

$W = \int_0^{10} 0.2(x-5)^2 dx = \frac{1}{5} \int_0^{10} x^2 - 10x + 25 dx = \frac{1}{5} \left(\frac{x^3}{3} - 5x^2 + 25x \right) \Big|_0^{10}$

$= \frac{1}{5} \left(\frac{10^3}{3} - \frac{5 \cdot 10^2}{1} + 25 \cdot 10 \right) - \left(\frac{0^3}{3} - \frac{5 \cdot 0^2}{1} + 25 \cdot 0 \right) = \frac{200}{3} - 50 + 50 = \frac{200}{3}$

$= \frac{200}{3} - 100 + 50 = \frac{200 - 150}{3} = \frac{50}{3} = 16\frac{2}{3} \text{ J}$

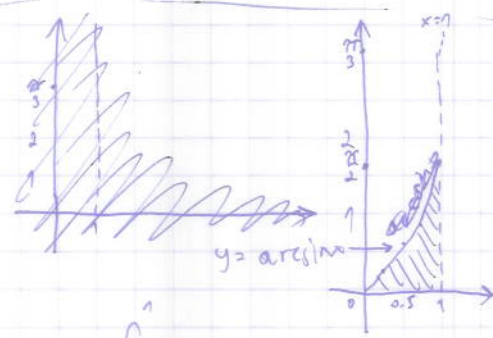
II 1



$$\Rightarrow \int_0^{\pi/4} \cos x - \sin x \, dx = (\sin x + \cos x) \Big|_0^{\pi/4} = \sin \frac{\pi}{4} + \cos \frac{\pi}{4} - (\sin 0 + \cos 0) = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} - 1 = \sqrt{2} - 1$$

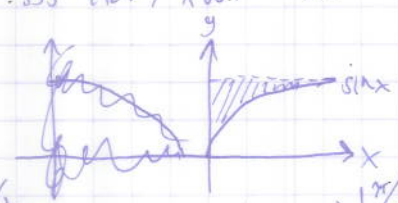
$$= (\sin \frac{\pi}{4} + \cos \frac{\pi}{4}) - (\sin 0 + \cos 0) = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} - 1 = \sqrt{2} - 1 = 0.4142 \dots$$

6



$$\Rightarrow \int_0^1 \arcsin x \, dx = ?$$

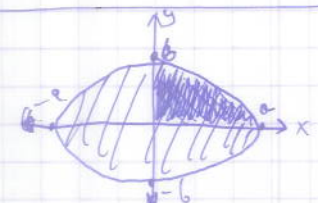
אם תב, אבן את כל 6, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100



$$\Rightarrow \int_0^{\pi/2} \sin x \, dx = (x + \cos x) \Big|_0^{\pi/2} = \left(\frac{\pi}{2} + \cos \frac{\pi}{2} \right) - (0 + \cos 0) = \left(\frac{\pi}{2} + 0 \right) - (0 + 1) = \frac{\pi}{2} - 1$$

$$\Rightarrow \int_0^{\pi/2} \sin x \, dx = \left(\frac{\pi}{2} - 1 \right) = 0.57 \dots$$

7 $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$



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$$y = \frac{b}{a} \sqrt{a^2 - x^2} \Rightarrow S = \int_{-a}^a \frac{b}{a} \sqrt{a^2 - x^2} \, dx = \frac{b}{a} \int_{-a}^a \sqrt{a^2 - x^2} \, dx$$

$$\int \sqrt{a^2 - x^2} \, dx = \left[\frac{a^2 - x^2}{2} \arcsin \frac{x}{a} - \frac{x^2}{2} \right]_{-a}^a = \left[\frac{a^2 - x^2}{2} \arcsin \frac{x}{a} + \frac{x \sqrt{a^2 - x^2}}{2} \right]_{-a}^a = \pi a b$$