

Mallikoe fouleske - 2012

1. a) $\int x^4 - \frac{2}{3}x - 11 dx = \frac{1}{5}x^5 - \frac{2}{3} \cdot \frac{1}{2}x^2 - 11x + C = \frac{1}{5}x^5 - \frac{1}{3}x^2 - 11x + C$

b) $g'(x) = 2e^{2x} \sin x + e^{2x} \cos x = e^{2x} (2 \sin x + \cos x) = f(x)$
ON SE.

2. a) $-x^2 - x + 6 = 0$ $\xrightarrow[\text{korva}]{\text{ratte}}$ $x = -3$ tai $x = 2$

$$A = \int_{-3}^2 -x^2 - x + 6 dx = \left[-\frac{1}{3}x^3 - \frac{1}{2}x^2 + 6x \right]_{-3}^2 = \dots = \frac{125}{6}$$

b) $\int -2e^{\frac{1}{3}x} dx = -2 \cdot 3 \int \frac{1}{3} e^{\frac{1}{3}x} dx = -6e^{\frac{1}{3}x} + C$

3. Leikk. pisteet $\begin{cases} y = 3x - 2 \\ y = x^2 - 2 \end{cases} \rightarrow x = 0 \text{ tai } x = 3$



$$A = \int_0^3 (3x - 2) - (x^2 - 2) dx = \int_0^3 \left(\frac{3}{2}x^2 - \frac{1}{2}x^3 \right) dx = \dots = \frac{9}{2}$$

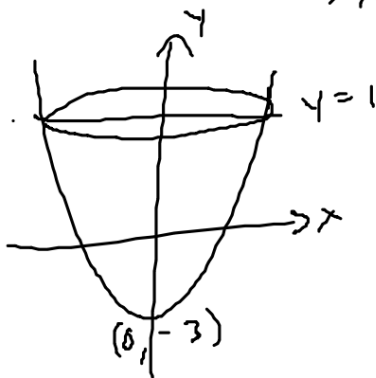
$$4. \quad \int x \sqrt{1-x^2} dx = -\frac{1}{2} \int -2x \sqrt{1-x^2} dx$$

$$= -\frac{1}{2} \cdot \frac{\pi}{3} (1-x^2)^{\frac{3}{2}} + C = -\frac{1}{3} (1-x^2)^{\frac{3}{2}} + C$$

Si paita $x=0 \rightarrow C = \frac{4}{3}$

$$5. \quad y = \frac{x^2}{3} - 3$$

$$\rightarrow x = \pm \sqrt{3y+9}$$



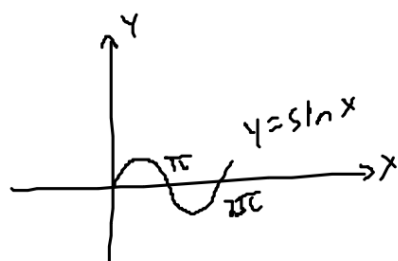
$$\Rightarrow V = \pi \int_{-3}^1 (\sqrt{3y+9})^2 dy$$

$$= \pi \int_{-3}^1 3y+9 dy$$

$$= \pi \left[\frac{3}{2} y^2 + 9y \right]_{-3}^1 = \dots = 24\pi$$

$\approx 75,4$

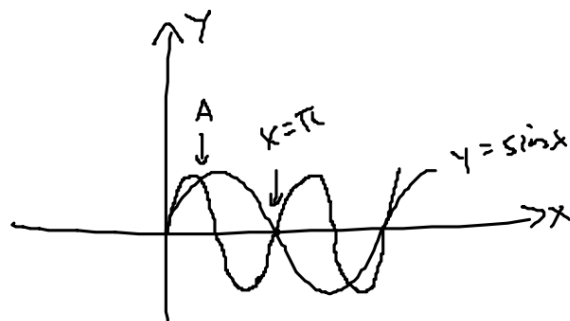
$$6. \int_0^{2\pi} |f(x) + \sin(x) - f(x)| dx = \int_0^{2\pi} \sin x dx$$



$$= 2 \cdot \int_0^{\pi} \sin x dx$$

$$= 2 \left[-\cos x \right]_0^{\pi} = 4$$

7.



$$A = \begin{cases} y = \sin x \\ y = \sin 2x \end{cases}$$

$$\sin x = \sin 2x$$

$$x = 2x + n2\pi$$

$$x = 0 + n2\pi \text{ and } x = \pi - 2x + n2\pi$$

$$3x = \pi + n2\pi$$

$$x = \frac{\pi}{3} + \frac{n2\pi}{3}$$

$$A = \int_0^{\frac{\pi}{3}} \sin 2x - \sin x dx + \int_{\frac{\pi}{3}}^{\pi} \sin x - \sin 2x dx = \dots$$

