

פתרון תרגיל בית 5

שאלה 1

$$\kappa. \int \frac{x-3}{x^2-6x+9} dx = \int \frac{x-3}{(x-3)^2} dx = \int \frac{1}{x-3} dx = \ln|x-3| + C$$

$$\begin{aligned} \text{ב. } \int \frac{2x-5}{x^{16}} dx &= \int \frac{2}{x^{15}} - \frac{5}{x^{16}} dx = \int (2x^{-15} - 5x^{-16}) dx = \\ &= \frac{2x^{-14}}{-14} - \frac{5x^{-15}}{-15} + C = -\frac{1}{7x^{14}} + \frac{1}{3x^{15}} + C \end{aligned}$$

$$\lambda. \int 5e^{4x+9} dx = \frac{5e^{4x+9}}{4} + C$$

$$\tau. \int -2 \cdot 3^{7x} dx = \frac{-2 \cdot 3^{7x}}{7 \ln 3} + C$$

$$\eta. \int (2x-6)^3 dx = \frac{(2x-6)^4}{4 \cdot 2} + C = \frac{1}{8} (2x-6)^4 + C$$

$$\iota. \int \frac{2x-4}{x-1} dx = \int 2 - \frac{2}{x-1} dx = 2x - 2 \ln|x-1| + C$$

$$\rho. \int 3\sqrt{5x-2} = 3 \int (5x-2)^{1/2} = \frac{3(5x-2)^{3/2}}{5 \cdot (3/2)} + C = \frac{2}{5} \sqrt{(5x-2)^3} + C$$

שאלה 2

$$\text{א. } \int \frac{e^{\frac{1}{x}}}{x^2} dx \quad \text{נציב: } t = \frac{1}{x} \quad .dt = -\frac{1}{x^2} dx$$

$$\int \frac{e^{\frac{1}{x}}}{x^2} dx = \int -e^t dt = -e^t + C = -e^{\frac{1}{x}} + C$$

$$\text{ב. } \int \frac{\ln^2 x}{x} dx \quad \text{נציב: } t = \ln x \quad .dt = \frac{1}{x} dx$$

$$\int \frac{\ln^2 x}{x} dx = \int t^2 dt = \frac{t^3}{3} + C = \frac{1}{3} \ln^3 x + C$$

$$\text{ג. } \int \frac{\cos x}{\sqrt[3]{\sin^2 x}} dx \quad \text{נציב: } t = \sin x \quad .dt = \cos x dx$$

$$\int \frac{\cos x}{\sqrt[3]{\sin^2 x}} dx = \int \frac{1}{\sqrt[3]{t^2}} dt = \int t^{-2/3} dt = \frac{t^{1/3}}{1/3} + C = 3\sqrt[3]{\sin x} + C$$

$$.dt = \cos x dx \Leftarrow t = \sin x \text{ נציב: } \int \frac{\cos x}{\sin^2 x + 1} dx \text{ .ט}$$

$$\int \frac{\cos x}{\sin^2 x + 1} dx = \int \frac{1}{t^2 + 1} dt = \arctan(t) + C = \arctan(\sin x) + C$$

$$.dt = 2x dx \Leftarrow t = x^2 + 4 \text{ נציב: } \int \frac{x^2 - 2x + 4}{x^2 + 4} dx \text{ .ה}$$

$$\int \frac{x^2 - 2x + 4}{x^2 + 4} dx = \int \left(1 - \frac{2x}{x^2 + 4}\right) dx = x - \int \frac{1}{t} dt = x - \ln t +$$

$$C = x - \ln(x^2 + 4) + C$$

בהצלחה!