Øving 11 MA0001 Sander Lindberg
Gruppe 3

Oppgave 1:

$T(t) = \int \cos\left(\frac{\pi}{6}t\right) dx$, Setter $\frac{\pi}{6}t = u$

$\frac{du}{dx} = \frac{\pi}{6}$

$dx = \frac{du \cdot 6}{\pi}$

$\int \cos(u) \frac{6\,du}{\pi}$

$\frac{6}{\pi}\int \cos(u)\,du = \frac{6}{\pi}\sin\left(\frac{\pi}{6}\right) + C$

$T(t) = \frac{6}{\pi}\sin\left(\frac{\pi}{6}t\right) + C$, Finner C ved å sette $T(0) = 45$

$45 = \frac{6}{\pi}\sin(0) + C$

$C = 45$

$\underline{T(t) = \frac{6}{\pi}\sin\left(\frac{\pi}{6}t\right) + 45}$

Temperaturen etter 3 timer blir $T(3) = \frac{6}{\pi}\sin\left(\frac{3\pi}{6}\right) + 45$

$= \frac{6}{\pi}\sin\left(\frac{\pi}{2}\right) + 45 = \underline{46.9 \text{ Fahrenheit}}$

Opgave 2:

$$f(x) = \frac{1}{\sqrt{2x}}$$

$$\int \frac{1}{\sqrt{2x}}\,dx \quad , \text{ setter } \quad u = 2x \qquad dx = \frac{du}{2}$$

$$\frac{1}{2}\int \frac{1}{\sqrt{u}}\,du = \frac{1}{2}\int u^{-\frac{1}{2}}\,du = \frac{1}{2}\cdot 2u^{\frac{1}{2}} + C$$

$$= \underline{\underline{\sqrt{2x} + C}}$$

Opgave 3:

$$f(x) = \frac{3}{x} + \sin(3x) + \frac{1}{x^3} + \sqrt[3]{x} + x^3 + 3^x$$

$$\int f(x) = \int \frac{3}{x}dx + \int \sin(3x)dx + \int \frac{1}{x^3} + \int \sqrt[3]{x} + \int x^3 + \int 3^x$$

$$= 3\ln|x| - \frac{1}{3}\cos(3x) - \frac{1}{2}x^{-2} + \int x^{\frac{1}{3}} + \frac{1}{4}x^4 + \frac{1}{\ln(3)}3^x + C$$

$$= \underline{\underline{3\ln|x| - \frac{\cos(3x)}{3} - \frac{1}{2x^2} + \frac{3}{4}x^{\frac{4}{3}} + \frac{1}{4}x^4 + \frac{3^x}{\ln(3)} + C}}$$

Oppgave 4:

$$f(x) = \frac{1}{1/4 + x^2}$$

$$\int \frac{1}{1/4 + x^2}\,dx = \int \frac{4}{1+4x^2} = 4\int \frac{1}{1+4x^2}, \quad \text{Setter } u = 2x$$

$$4\int \frac{1}{1+(2x)^2}\,dx = 4\int \frac{1}{1+u^2}\,\frac{du}{2} = 2\arctan(u) + C$$

$$= \underline{2\arctan(2x) + C}$$