

Section 6.1

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Calculus II: August 2016 - December 2016

Problem 3

$$x = e^y \quad x = y^2 - 2$$

$$a = -1 \quad b = 1$$

$$\int_{-1}^1 e^y - (y^2 - 2) dy$$

$$\left[e^y - \frac{y^3}{3} + 2y \right]_{-1}^1$$

$$\left[e - \frac{1}{3} + 2 \right] - \left[e^{-1} - \frac{-1}{3} - 2 \right]$$

$$= e - \frac{1}{e} + \frac{10}{3}$$

Problem 8

$$y = x^2 - 4x \quad y = 2x$$

$$x^2 - 4x = 2x$$

$$x^2 - 6x = x(x - 6) = 0$$

$$x = 0 \quad x = 6$$

$$\int_0^6 2x - (x^2 - 4x) dx$$

$$\left[\frac{6x^2}{2} - \frac{x^3}{3} \right]_0^6$$

$$\left[3 \times 6^2 - \frac{6^3}{3} \right] - [0 - 0]$$

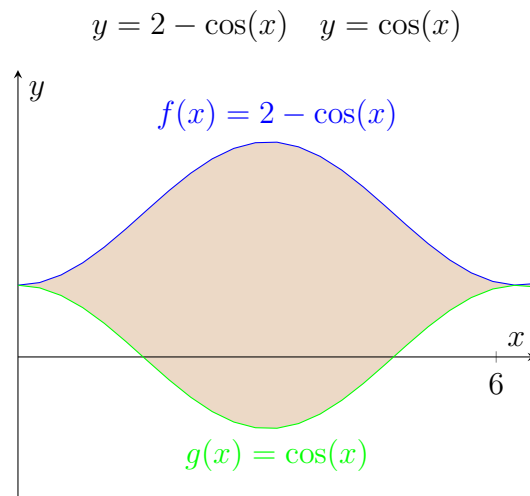
$$108 - 72$$

$$= 36$$

Problem 13

$$\begin{aligned}y &= 12 - x^2 & y &= x^2 - 6 \\12 - x^2 &= x^2 - 6 \\2x^2 - 18 &= x^2 - 9 = (x + 3)(x - 3) = 0 \\x &= -3 & x &= 3 \\ \int_{-3}^3 12 - x^2 - (x^2 - 6) dx \\ 2 \int_0^3 18 - 2x^2 dx &= 4 \int_0^3 9 - x^2 dx \\ &4 \left[9x - \frac{x^3}{3} \right]_0^3 \\ &4 \left(\left[9(3) - \frac{3^3}{3} \right] - [0 - 0] \right) \\ &4(27 - 9) \\ &= 72\end{aligned}$$

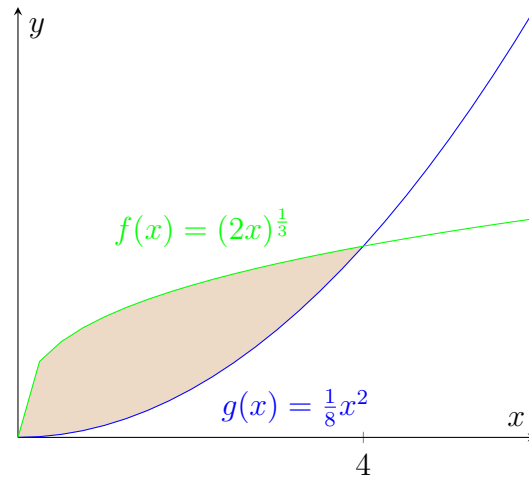
Problem 16



$$\begin{aligned}\int_0^{2\pi} 2 - \cos(x) - (\cos(x)) dx \\ \left[2x - 2 \sin(x) \right]_0^{2\pi} \\ \left[2(2\pi) - 2 \sin(2\pi) \right] - \left[0 - 2 \sin(0) \right] \\ = 4\pi\end{aligned}$$

Problem 23

$$y = \frac{1}{8}x^2 \quad y = (2x)^{\frac{1}{3}}$$



$$\int_0^4 (2x)^{\frac{1}{3}} - \frac{1}{8}x^2 dx$$

$$\int_0^4 (2x)^{\frac{1}{3}} dx - \int_0^4 \frac{1}{8}x^2 dx$$

$$\text{Let : } u = 2x$$

$$du = 2dx$$

$$\frac{1}{2} \int u^{\frac{1}{3}} du - \frac{1}{8} \int_0^4 x^2 dx$$

$$\frac{1}{2} \frac{3u^{\frac{4}{3}}}{4} - \frac{1}{8} \frac{x^3}{3}$$

$$\left[\frac{3(2x)^{\frac{4}{3}}}{8} - \frac{x^3}{24} \right]_0^4$$

$$\left[\frac{3(8)^{\frac{4}{3}}}{8} - \frac{4^3}{24} \right] - [0 - 0]$$

$$\left[6 - \frac{8}{3} \right]$$

$$= \frac{16}{3}$$

If any errors are found, please contact me at alvin.lin.dev@gmail.com