

## Section 6.1

Alvin Lin

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### Exercise 3

$$\begin{aligned}x &= e^y & x &= y^2 - 2 \\a &= -1 & b &= 1 \\& \int_{-1}^1 e^y - (y^2 - 2) \, dy \\& \left[ e^y - \frac{y^3}{3} + 2y \right]_{-1}^1 \\& [e - \frac{1}{3} + 2] - [e^{-1} - \frac{-1}{3} - 2] \\& = e - \frac{1}{e} + \frac{10}{3}\end{aligned}$$

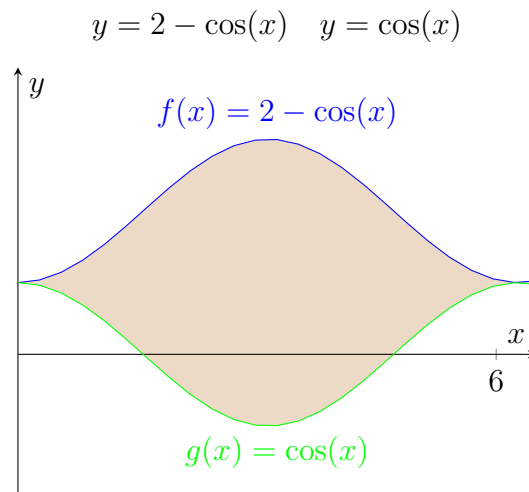
### Exercise 8

$$\begin{aligned}y &= x^2 - 4x & y &= 2x \\x^2 - 4x &= 2x \\x^2 - 6x &= x(x - 6) = 0 \\x &= 0 & x &= 6 \\& \int_0^6 2x - (x^2 - 4x) \, dx \\& \left[ \frac{6x^2}{2} - \frac{x^3}{3} \right]_0^6 \\& [3 \times 6^2 - \frac{6^3}{3}] - [0 - 0] \\& 108 - 72 \\& = 36\end{aligned}$$

## Exercise 13

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

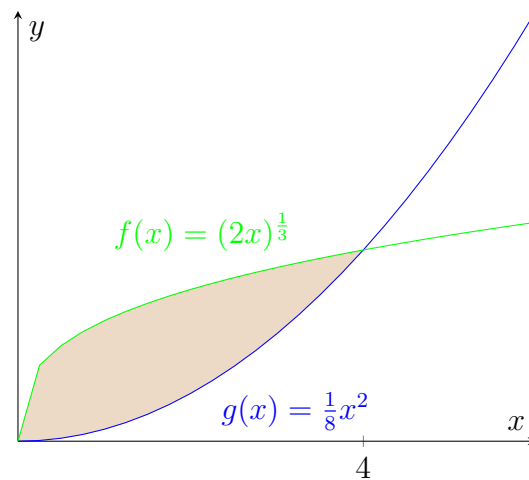
## Exercise 16



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

## Exercise 23

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



$$\begin{aligned} & \int_0^4 (2x)^{\frac{1}{3}} - \frac{1}{8}x^2 \, dx \\ & \int_0^4 (2x)^{\frac{1}{3}} \, dx - \int_0^4 \frac{1}{8}x^2 \, dx \\ & \text{Let : } u = 2x \\ & \quad du = 2 \, dx \\ & \frac{1}{2} \int u^{\frac{1}{3}} \, du - \frac{1}{8} \int_0^4 x^2 \, dx \\ & \quad \frac{1}{2} \frac{3u^{\frac{4}{3}}}{4} - \frac{1}{8} \frac{x^3}{3} \\ & \quad \left[ \frac{3(2x)^{\frac{4}{3}}}{8} - \frac{x^3}{24} \right]_0^4 \\ & \quad \left[ \frac{3(8)^{\frac{4}{3}}}{8} - \frac{4^3}{24} \right] - [0 - 0] \\ & \quad \left[ 6 - \frac{8}{3} \right] \\ & \quad = \frac{16}{3} \end{aligned}$$

If you have any questions, comments, or concerns, please contact me at [alvin@omgimanerd.tech](mailto:alvin@omgimanerd.tech)