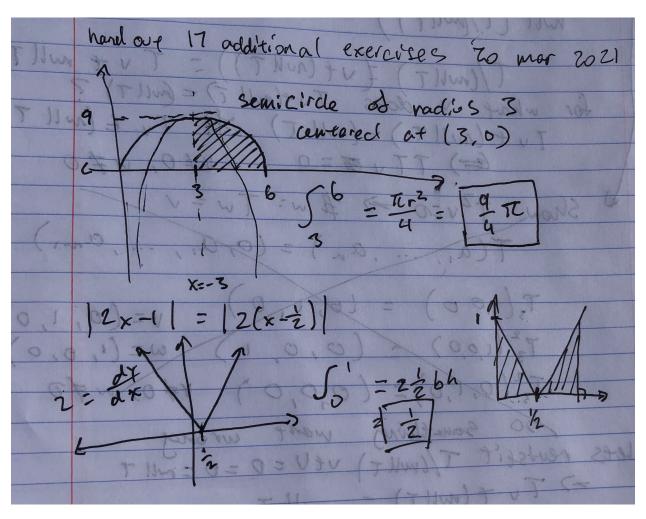
## 1 | Exercises

## 1.1 | interpreting in terms of area



## 1.3 | subtracting integrals

I expect

$$\int_{1}^{2} f(x)dx = \int_{1}^{5} f(x)dx - \int_{2}^{5} f(x)dx = -3 - 4 = -7$$

In fact, I expect

$$\int_{a}^{b} f(x)dx + \int_{b}^{c} f(x)dx = \int_{a}^{c} f(x)dx$$

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1.4 | show 
$$\int_a^b x^2 dx = \frac{b^3 - a^3}{3}$$

$$\int_{a}^{b} x^{2} dx = \lim_{n \to \infty} \sum_{k=0}^{n} \frac{b-a}{n} \left(a + k \frac{b-a}{n}\right)^{2}$$

$$= \lim_{n \to \infty} \frac{b-a}{n} \sum_{k=0}^{n} \left(a + k \frac{b-a}{n}\right)^{2}$$

$$= \lim_{n \to \infty} \frac{b-a}{n} \sum_{k=0}^{n} a^{2} + 2ak \frac{b-a}{n} + \left(k \frac{b-a}{n}\right)^{2}$$

$$= \lim_{n \to \infty} \frac{b-a}{n} \sum_{k=0}^{n} a^{2}$$

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