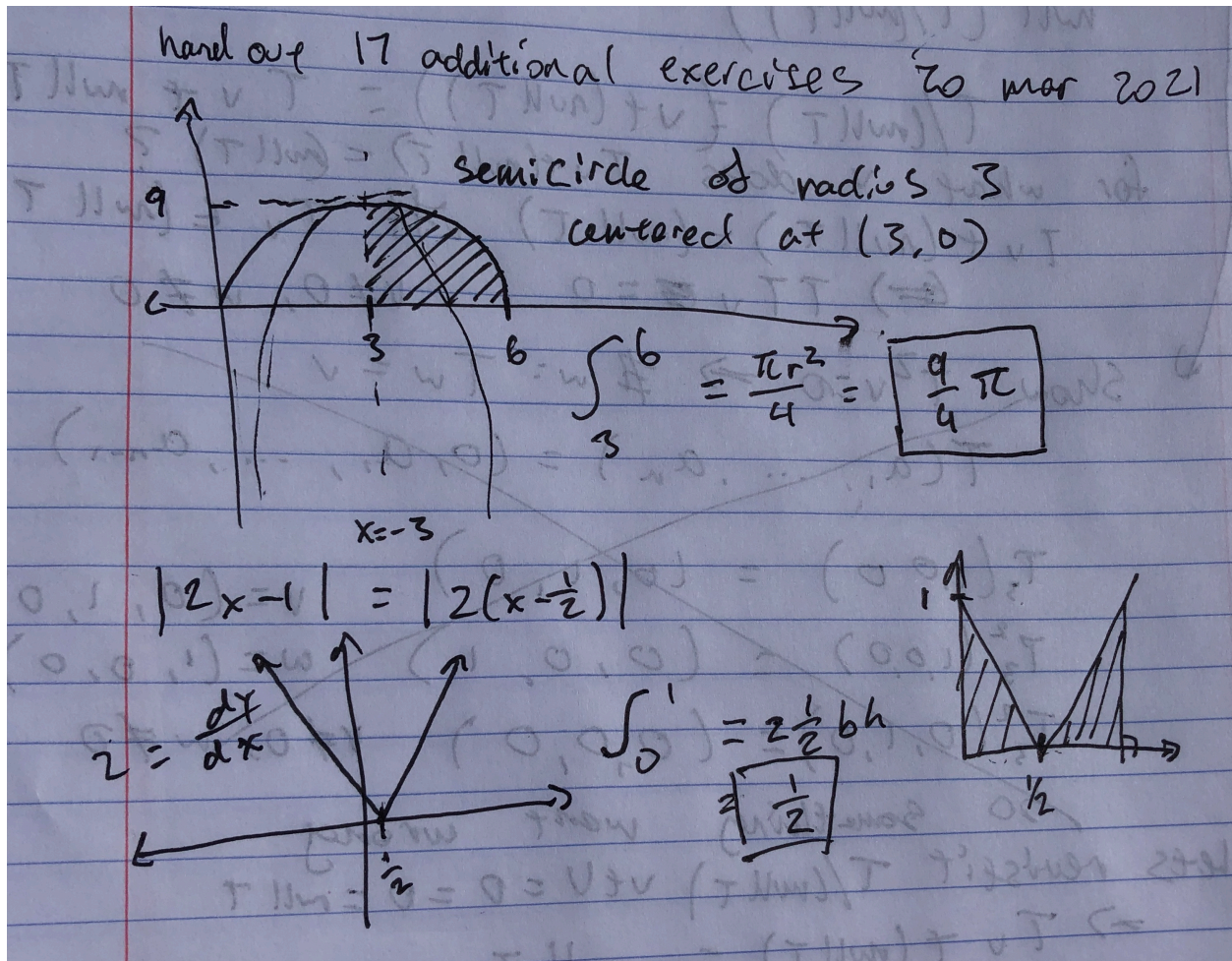


1 | Exercises

1.1 | 1.1 and 1.2



1.2 | 1.3

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

$$\int_a^b f(x) dx + \int_b^c f(x) dx = \int_a^c f(x) dx$$

1.3 | 1.4

$$\begin{aligned}
 \int_a^b x^2 dx &= \lim_{n \rightarrow \infty} \sum_{k=0}^n \frac{b-a}{n} \left(a + k \frac{b-a}{n} \right)^2 \\
 &= \lim_{n \rightarrow \infty} \frac{b-a}{n} \sum_{k=0}^n \left(a + k \frac{b-a}{n} \right)^2 \\
 &= \lim_{n \rightarrow \infty} \frac{b-a}{n} \sum_{k=0}^n a^2 + 2ak \frac{b-a}{n} + \left(k \frac{b-a}{n} \right)^2 \\
 &= \lim_{n \rightarrow \infty} \frac{b-a}{n} \sum_{k=0}^n a^2
 \end{aligned}$$