

Homework 2

Due Monday, January 20, 2020

1. Given that

$$\int_{-1}^2 f = 3 \quad \text{and} \quad \int_{-1}^6 f = 4,$$

and

$$\int_{-1}^3 g = 1 \quad \text{and} \quad \int_{-1}^6 g = 2,$$

find

(a) (2 points) $\int_2^6 f$

(b) (2 points) $\int_3^6 g$

(c) (2 points) $\int_{-1}^6 (f + g)$

2. (3 points) Use upper and lower sums to show that

$$1 \leq \int_{-1}^1 \frac{dx}{1+x^2} \leq 2.$$

3. Calculate the following.

(a) (3 points) $\frac{d}{dx} \left[\int_1^{3x^2} t \sin(t) dt \right]$

(b) (3 points) $\frac{d}{dx} \left[\int_x^{x^2} \frac{t}{1+t^2} dt \right]$

4. Let $F(x) = \cos(x) + \int_0^{x^2} \frac{\cos(3t)}{1+t^2} dt$.

(a) (2 points) Find $F(0)$.

(b) (3 points) Find $F'(0)$.