

## More Properties of Integrals- HW Problems

1. Evaluate the following definite integrals using symmetry (i.e.  $f$  odd/even) where applicable.

$$a. \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (x \cos(x) + \cos(x)) dx$$

$$b. \int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} x^2 \sin(x) dx$$

$$c. \int_{-1}^1 (2 - |x|) dx$$

Find the average value of the function on the given interval.

$$2. f(x) = x^2 - 9 \quad \text{on } [-3, 3]$$

$$3. G(x) = \sin(x) \quad \text{on } [0, \pi]$$

$$4. h(x) = \cos(x) \quad \text{on } \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$$

5. The profit in thousands of dollars over time of a firm's new product is given by  $P(t) = 4(-t^2 + 20t + 20)$ , where  $t$  is in months. Find the average profit over the first 6 months.

Find all values of  $c$  guaranteed by the mean value theorem for integrals.

$$6. f(x) = \frac{1}{x^2} \quad \text{on } [1, 4].$$

$$7. f(x) = -3x^2 + 12x + 2 \quad \text{on } [0, 4].$$