

## Worksheet 16

**Name:**

1. Give an example of an odd function  $f(x)$ . For your choice of function, compute the exact value of the integral  $\int_{-2}^2 f(x) dx$ .
2. What do you suspect about  $\int_{-a}^a g(t) dt$  if  $g(t)$  is an odd function?
3. Give an example of an even function  $f(x)$ . Compute the exact values of  $\int_0^3 f(x) dx$  and  $\int_{-3}^3 f(x) dx$ . How do these values compare?
4. In general, how does the integral of  $\int_0^a g(t) dt$  compare to  $\int_{-a}^a g(t) dt$  if  $g(t)$  is an even function?

**Definition.** The *average value of a function*  $f(x)$  on the interval  $[a, b]$  is given by the formula

$$\text{Average value of } f(x) \text{ on } [a, b] = \frac{1}{b-a} \int_a^b f(x) dx$$

Use this idea to answer (part (b) ) of the next question.

5. In the year 2000, the population of Nevada was modeled by the function  $P = f(t) = 2.02(1.04)^t$  where  $P$  is given in millions of people and  $t$  is given in years since 2000.
  - (a) What does the integral  $\int_0^{20} f'(t) dt$  represent?
  - (b) Write an expression that gives the average population between the year 2000 and the year 2030.
  - (c) Compute the integral in part (b) using the fundamental theorem of calculus.