Warm-up Problems

1. **Clicker** For the graph below, the units of the horizontal axis, \( t \), is in seconds. The units of the vertical axis, \( v(t) \), is in feet per second.

![Graph of v(t) vs. t]

Shade in the area under the curve and above the horizontal axis between \( t = 1 \) and \( t = 5 \). The units of the area is:

(a) \( \text{ft}^2 \)
(b) \( \text{ft} \)
(c) \( \text{sec} \)
(d) \( \text{ft/sec} \)
(e) I don’t know but Prof Thornton is awesome

2. Estimate the area you shaded in Problem 1.

3. Compute the following:

(a) \( \sum_{i=1}^{5} \pi = \)
(b) \( \sum_{i=1}^{5} i = \)
(c) \( \sum_{i=1}^{5} i^2 = \)
(d) \( \sum_{i=1}^{5} (i + i^2) = \)
Class Problems

4. **Clicker** Compute \( \int_{-1}^{2} |x| \, dx \)

   (a) 1.5  
   (b) 2  
   (c) 2.5  
   (d) 3

5. \( \int_{-5}^{0} \sqrt{25 - x^2} \, dx = \)

6. For this problem, we’re going to compute \( \int_{1}^{3} x^2 \, dx \) using a Riemann Sum.

   (a) \( a = \)  
   (b) \( b = \)  
   (c) \( \Delta x = \)  
   (d) \( x_i = \)  
   (e) RiemannSum =  
   (f) Simplify the Riemann sum (goal: have an algebraic expression without any \( \sum \) symbols)  
   (g) The definite integral is the limit of your Riemann sums as \( n \to \infty \). Find this.

Properties of the Definite Integral

I. \( \int_{a}^{b} c \, dx = c(b - a) \)

II. \( \int_{a}^{b} f(x) + g(x) \, dx = \int_{a}^{b} f(x) \, dx + \int_{a}^{b} g(x) \, dx \)

III. \( \int_{a}^{b} cf(x) \, dx = c \int_{a}^{b} f(x) \, dx \)

IV. \( \int_{a}^{b} f(x); dx = -\int_{b}^{a} f(x) \, dx \)

V. \( \int_{a}^{b} f(x) \, dx = \int_{a}^{c} f(x) \, dx + \int_{c}^{b} f(x) \, dx \)

7. Suppose \( \int_{1}^{5} f(x) \, dx = 1 - \frac{1}{b} \). Using properties of integrals, compute:

   (a) \( \int_{1}^{5} f(x) \, dx = \)  
   (b) \( \int_{1/2}^{1} f(x) \, dx = \)  
   (c) \( \int_{1}^{6} 3f(x) - 4 \, dx = \)  
   (d) \( \int_{3}^{5} f(x) \, dx = \)