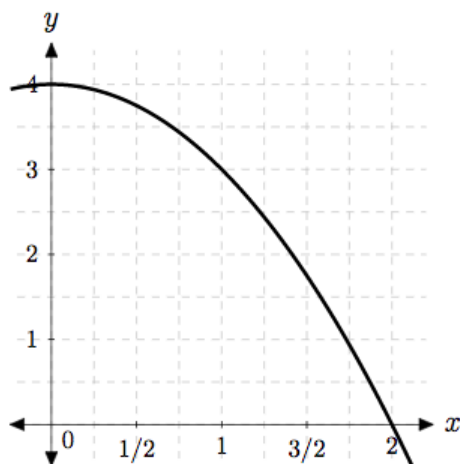

Homework #15: Areas and the definite integral

Note: Your work can only be assessed if it is legible.

1. The graph of $y = 4 - x^2$ over the interval $[0, 2]$ is given below.



In (a), (b), and (c) below, estimate $\int_0^2 4 - x^2$ using 4 rectangles and the indicated type of endpoints (i.e. sketch the rectangles and then compute their areas).

(a) Right endpoints.

(b) Left endpoints.

(c) Midpoints.

2. Evaluate the integral $\int_1^4 x + 1 \, dx$ by drawing a picture and interpreting the integral in terms of areas.

3. Evaluate the integral $\int_{-3}^3 \sqrt{9 - x^2} \, dx$ by drawing a picture and interpreting the integral in terms of areas.

4. Evaluate the integral $\int_0^2 -x \, dx$ by drawing a picture and interpreting the integral in terms of areas.

5. Use the definition of the definite integral to evaluate $\int_0^3 4x^3 + 6x \, dx$.

To do this, use a right endpoint sum and the fact that $\sum_{i=1}^n i = \frac{n(n+1)}{2}$ and $\sum_{i=1}^n i^3 = \left[\frac{n(n+1)}{2} \right]^2$.