

Worksheet 26: Anti-Derivatives

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1. Find f

(a) $f''(x) = 8x^3 + 5, f(1) = 0, f'(1) = 8$

(b) $f''(t) = 2e^t + 3\sin(t), f(0) = 0, f'(\pi) = 0$

(c) $f'''(x) = \cos(x), f(0) = 1, f'(0) = 2, f''(0) = 3$

2. Find the anti-derivative:

(a) $f(x) = \frac{20x^4 + 12x}{4x^5 + 6x^2 + 1}$

(b) $y = \frac{1}{1+x^2}$

(c) $f(x) = -\sin(2x)e^{\cos(2x)}$

3. (a) Estimate the area under the graph of $f(x) = \sqrt{x}$ from $x = 0$ to $x = 4$ using four approximating rectangles and right endpoints. Sketch the graph and rectangles. Is your estimate an under or overestimate?

(b) Repeat part (a) with left endpoints.

4. Evaluate the upper and lower sums for $f(x) = 1 + x^2$, $-1 \leq x \leq 1$ with $n = 3$ and $n = 4$. Sketch each.

5. Determine a region whose area is equal to the limit $\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{2}{n} \left(5 + \frac{2i}{n}\right)^{10}$.