

AP Calculus AB

Name: _____ Score: _____

1. A tap runs at 3 L/min for 4 min. The area under the rate graph (accumulated volume) is...

2. For $f(x) = x^2$ on $[0, 2]$ with 2 right rectangles (width 1): heights $f(1) = 1$, $f(2) = 4$. Find the right Riemann sum.

3. For n equal strips on $[a, b]$, the width Δx is...

☐ $n(b - a)$

☐ $b - a$

☐ $\frac{b - a}{n}$

☐ $\frac{n}{b - a}$

4. By FTC Part 1, $\frac{d}{dx} \int_a^x f(t) dt =$

☐ $F(x) - F(a)$

☐ $f(a)$

☐ $f(x)$

☐ $f'(x)$

5. For $g(x) = \int_a^x f(t) dt$, g is increasing exactly where...

☐ $f(x) < 0$

☐ $f(x) > 0$

☐ $f'(x) > 0$

☐ $g(x) > 0$

6. Given $\int_0^4 f dx = 10$ and $\int_0^4 g dx = 3$, find $\int_0^4 (2f - g) dx$.

7. FTC Part 2 says $\int_a^b f dx =$

☐ $F(a) - F(b)$

☐ $f'(b) - f'(a)$

☐ $F(b) - F(a)$ where $F' = f$

☐ $f(b) - f(a)$

8. What is $\int x^3 dx$?

☐ $\frac{x^4}{4} + C$

☐ $3x^2 + C$

☐ $x^4 + C$

☐ $\frac{x^2}{2} + C$

9. Evaluate $\int_0^1 3x^2(x^3 + 1)^2 dx$ (let $u = x^3 + 1$). Enter a decimal.

10. You can check any antiderivative by differentiating it back to the integrand.

☐ True ☐ False

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1. **12**

Rectangle area = $3 \times 4 = 12$ L.

2. **5**

$$1 \cdot 1 + 4 \cdot 1 = 5.$$

3. $\frac{b-a}{n}$

The interval width divided by the number of strips.

4. $f(x)$

The derivative of the accumulation function is the integrand $f(x)$.

5. $f(x) > 0$

$g' = f$, so g increases where $f > 0$.

6. **17**

$$2(10) - 3 = 17.$$

7. $F(b) - F(a)$ **where** $F' = f$

Evaluate an antiderivative at upper minus lower limit.

8. $\frac{x^4}{4} + C$

Add one to the exponent, divide by it: $\frac{x^4}{4} + C$.

9. **2.333**

$$\int_1^2 u^2 du = \frac{8-1}{3} = \frac{7}{3} \approx 2.333.$$

10. **True**

Differentiating your answer should return f .