

AP Calculus BC

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. For $g(x) = \int_a^x f(t) dt$, g is increasing exactly where...
- ☐ $f(x) < 0$
 - ☐ $f(x) > 0$
 - ☐ $f'(x) > 0$
 - ☐ $g(x) > 0$
5. Given $\int_0^4 f dx = 10$ and $\int_0^4 g dx = 3$, find $\int_0^4 (2f - g) dx$.

6. What is $\int x^3 dx$?
- ☐ $\frac{x^4}{4} + C$
 - ☐ $3x^2 + C$
 - ☐ $x^4 + C$
 - ☐ $\frac{x^2}{2} + C$
7. u-substitution is the reverse of which differentiation rule?
- ☐ the chain rule
 - ☐ the power rule only
 - ☐ the product rule

☐ the quotient rule

8. The integration by parts formula is $\int u \, dv =$

☐ $uv + \int v \, du$

☐ $\int v \, du - uv$

☐ $u \, du - v \, dv$

☐ $uv - \int v \, du$

9. For $\frac{1}{(x-1)(x+2)} = \frac{A}{x-1} + \frac{B}{x+2}$, find A (plug $x = 1$).

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. $f(x) > 0$

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

5. **17**

$2(10) - 3 = 17$.

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

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

7. **the chain rule**

It undoes the chain rule.

8. $uv - \int v \, du$

$\int u \, dv = uv - \int v \, du$ (mind the minus).

9. **0.333**

At $x = 1$: $1 = A(3) \Rightarrow A = \frac{1}{3}$.

10. **True**

Differentiating your answer should return f .