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...

   ☐ $n(b - a)$

   ☐ $b - a$

   ☐ $\dfrac{b - a}{n}$

   ☐ $\dfrac{n}{b - a}$

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 $\displaystyle\int x^3\,dx$?

   ☐ $\dfrac{x^4}{4} + C$

   ☐ $3x^2 + C$

   ☐ $x^4 + C$

   ☐ $\dfrac{x^2}{2} + C$

7. u-substitution is the reverse of which differentiation rule?

   ☐ the chain rule

   ☐ the power rule only

   ☐ the product rule

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

   _____

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

    ☐ True ☐ False

1. **12**

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

2. **5**

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

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

   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. $\dfrac{x^4}{4} + C$

   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**

   Clear the denominators first: $1 = A(x+2) + B(x-1)$. This polynomial identity holds at $x = 1$, giving $1 = 3A$ and $A = 1/3$.

10. **True**

    Differentiating your answer should return f.

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