

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Evaluate $\int \frac{t}{(1+5t^2)} dt$. $u = 1+5t^2$ $\frac{du}{dt} = 10t$ $du = 10t dt$ $dt = \frac{du}{10t}$

$$\int \frac{t}{u} \frac{du}{10t} = \frac{1}{10} \int \frac{1}{u} du = \frac{1}{10} \ln u + C = \boxed{\frac{1}{10} \ln(1+5t^2) + C}$$

I chose u to equal the group in (), I found the deriv. and solved for dt . I rewrote my original equation substituting u and dt into it. I simplified, found the antideriv., substituted by what u stood for and added a $+C$.

Excellent!

2. Evaluate $\int_1^3 t^2 \ln t dt$. Int. by Parts!

$$= \frac{t^3}{3} \cdot \ln t - \int \frac{1}{t} \cdot \frac{t^3}{3} dt$$

$$= \frac{t^3}{3} \cdot \ln t - \frac{1}{3} \int t^2 dt$$

$$= \frac{t^3}{3} \cdot \ln t - \frac{1}{3} \cdot \frac{t^3}{3}$$

$$= \left[\frac{t^3}{3} \cdot \ln t - \frac{t^3}{9} \right]_1^3$$

$$= (9 \ln 3 - 3) - \left(\frac{1}{3} \ln 1 - \frac{1}{9} \right)$$

$$= 9 \ln 3 - 3 + \frac{1}{9}$$

$$= 9 \ln 3 - \frac{26}{9}$$

$$u = \ln t$$

$$v = \frac{t^3}{3}$$

$$u' = \frac{1}{t}$$

$$v' = t^2$$

Check:

$$\left(\frac{t^3}{3} \cdot \ln t - \frac{t^3}{9} \right)'$$

$$= t^2 \cdot \ln t + \frac{t^3}{3} \cdot \frac{1}{t} - \frac{3t^2}{9}$$

$$= t^2 \cdot \ln t \checkmark$$