

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

1. Evaluate $\int \frac{t}{1-3t^2} dt =$

$$\text{let } u = 1-3t^2$$

$$\frac{du}{dt} = -6t$$

Nice Job!

$$\int \frac{t}{1-3t^2} dt = \int \frac{t}{u} \cdot \frac{du}{-6t} = -\frac{1}{6} \int \frac{1}{u} du = -\frac{1}{6} \ln u = -\frac{1}{6} \ln(1-3t^2) + C$$

Justification

$$\left[-\frac{1}{6} \ln(1-3t^2) \right]' = -\frac{1}{6} \frac{1}{1-3t^2} (-6t) = \frac{t}{1-3t^2}$$

2. Evaluate $\int t e^{5t} dt =$

$$u = t \quad v = \frac{1}{5} e^{5t}$$

$$u' = 1 \quad v' = e^{5t}$$

$$t \left(\frac{1}{5} e^{5t} \right) - \int \frac{1}{5} e^{5t}$$

$$\frac{1}{5} t e^{5t} - \frac{1}{25} e^{5t} + C$$

Great Job!

$$\left[t \left(\frac{1}{5} e^{5t} \right) - \frac{1}{25} e^{5t} \right]' = t e^{5t} + \frac{1}{5} e^{5t} (1) - \frac{1}{5} e^{5t}$$

$$= t e^{5t}$$