

Please show **all** your work! Answers without supporting work will not be given credit.
Write answers in spaces provided.

Name: _____

1. [4 pts] Compute $\int 5 \cot\left(\frac{x}{8}\right) dx$

Solution:

$$\int 5 \cot\left(\frac{x}{8}\right) dx = 5 \int \frac{\cos(x/8)}{\sin(x/8)} dx \quad [1 \text{ pt}]$$

$$\begin{array}{l} \underline{u=\sin(x/8)} \\ du = \frac{1}{8} \cos(x/8) dx \\ 8 du = \cos(x/8) dx \end{array} \quad 5 \int \frac{8 du}{u} \quad [1 \text{ pt}]$$

$$= 40 \ln |u| + C \quad [1 \text{ pt}]$$

$$= 40 \ln \left| \sin\left(\frac{x}{8}\right) \right| + C \quad [1 \text{ pt}]$$

2. [3 pts] Compute $\int \frac{1}{x \ln(x^{19})} dx$.

Solution:

$$\int \frac{1}{x \ln(x^{19})} dx \quad \begin{array}{l} u = \ln(x^{19}) \\ du = \frac{19x^{18}}{x^{19}} dx \\ \frac{du}{19} = \frac{1}{x} dx \end{array} \quad \int \frac{1}{u} \cdot \frac{du}{19} \quad [1 \text{ pt}]$$

$$= \frac{1}{19} \ln |u| + C \quad [1 \text{ pt}]$$

$$= \frac{1}{19} \ln |\ln(x^{19})| + C \quad [1 \text{ pt}]$$

3. [3 pts] Compute $\int \frac{4(\ln(x))^3}{x} dx$.

Solution:

$$\int \frac{4(\ln(x))^3}{x} dx \stackrel{u=\ln(x)}{du=\frac{1}{x} dx} 4 \int u^3 du \quad [1 \text{ pt}]$$

$$= 4 \cdot \frac{1}{4} u^4 \quad [1 \text{ pt}]$$

$$= u^4$$
$$= (\ln(x))^4 + C \quad [1 \text{ pt}]$$