M126
Fall 2025

Quiz #6

Name: Key

**Show all your work!** No calculators allowed. The page of trig formulas will also be handed out in class, but you may not use any other notes.

1. Evaluate: $\int x^3 e^{2x}\,dx$

$$= e^{2x}\left(\frac{1}{2}x^3 - \frac{3}{4}x^2 + \frac{3}{8}x - \frac{3}{16}\right) + C$$

| | | |
|---|---|---|
| + | $x^3$ | $e^{2x}$ |
| − | $3x^2$ | $\frac{1}{2}e^{2x}$ |
| + | $3x$ | $\frac{1}{4}e^{2x}$ |
| − | $3$ | $\frac{1}{8}e^{2x}$ |
| + | $0$ | $\frac{1}{16}e^{2x}$ |

2. Evaluate by using integration by parts: $\int \ln(x)\,dx$

| | | |
|---|---|---|
| + | $\ln(x)$ | $1$ |
| − | $1/x$ | $x$ |

$$= x\ln x - \int \frac{1}{x}\cdot x\,dx = x\ln x - x + C$$

**Turn Page Over...**

3. Evaluate: $\int \sin^3(x)\cos(x)\,dx$

$u = \sin(x)$

$du = \cos(x)\,dx$

$\int u^3\,du = \frac{1}{4}u^4 + C$

$= \boxed{\frac{1}{4}\sin^4(x) + C}$

4. Evaluate: $\int \sin^2(x)\,dx$ $= \int \frac{1}{2}(1-\cos(2x))\,dx$

$= \frac{1}{2}\int 1\,dx - \frac{1}{2}\int \cos(2x)\,dx$

$= \frac{1}{2}x - \frac{1}{2}\cdot\frac{1}{2}\sin(2x) + C$

$= \frac{1}{2}x - \frac{1}{4}\sin(2x) + C$