

PRINT Your Name: _____ Recitation Time _____
 There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. **CIRCLE** your answer. **NO CALCULATORS! CHECK** your answer whenever possible.

1. Find $\int e^x \sin 4x dx$.
 $u = e^x \quad v = -\frac{\cos 4x}{4}$
 $du = e^x dx \quad dv = \sin 4x dx$

$\int u dv = uv - \int v du$

The integral is equal to $-\frac{1}{4} e^x \cos 4x + \frac{1}{4} \int e^x \cos 4x dx$

$-\frac{1}{4} e^x \cos 4x + \frac{1}{4} \left(\frac{1}{4} e^x \sin 4x - \frac{1}{4} \int e^x \sin 4x dx \right)$
 \uparrow
 $v = \frac{1}{4} \sin 4x$
 $du = e^x dx \quad dv = \cos 4x dx$

Thus $\int e^x \sin 4x dx = \frac{1}{4} e^x \cos 4x + \frac{1}{16} e^x \sin 4x - \frac{1}{16} \int e^x \sin 4x dx$

$\therefore \frac{17}{16} \int e^x \sin 4x dx = -\frac{1}{4} e^x \cos 4x + \frac{1}{16} e^x \sin 4x$

$\int e^x \sin 4x dx = \frac{16}{17} \left(-\frac{1}{4} e^x \cos 4x + \frac{1}{16} e^x \sin 4x \right) + C$

2. Find $\int \frac{x}{\sqrt{16-9x^2}} dx$ \uparrow $-\frac{1}{18} \int u^{-1/2} du = -\frac{1}{9 \cdot 18} u^{1/2} + C = \left(-\frac{1}{9} \sqrt{16-9x^2} + C \right)$

$u = 16 - 9x^2$
 $du = -18x dx$