Quiz 13 Calculus 1 11/26/2002

Each problem is worth 5 points. Show complete justification for full credit.

1. Use a u-substitution to show that $\int \cos 5\theta \, d\theta = \frac{1}{5}\sin 5\theta + C$.

$u = 5\theta$

$\frac{du}{d\theta} = 5$

$= \int \cos 5\theta \, d\theta$

$d\theta = \frac{du}{5}$

$= \int \frac{1}{5} \cos u \, du$

$= \frac{1}{5} \int \cos u \, du$

$= \frac{1}{5} \sin u + C$

Great!

$\boxed{= \frac{1}{5} \sin 5\theta + C}$

2. Use a u-substitution to show that $\int_e^{e^4} \frac{dx}{x\sqrt{\ln x}} \, dx = 2$.

$u = \ln x$

$\frac{du}{dx} = \frac{1}{x}$

$x\,du = dx$

$\int_e^{e^4} \frac{dx}{x\sqrt{\ln x}}$

$\int_e^{e^4} \frac{\cancel{x}\, u^{-1/2}\, du}{\cancel{x}}$

$\int_e^{e^4} u^{-1/2} \, du$

$\left(2u^{1/2}\right)\Big|_e^{e^4} = (2)\left[(\ln x)^{1/2}\right]_e^{e^4}$

$2\left(\sqrt{\ln e^4} - \sqrt{\ln e}\right)$

$2\left(\sqrt{4 \ln e} - \sqrt{\ln e}\right)$

$\ln e = 1$

$2\left(\sqrt{4} - \sqrt{1}\right) = 2(2-1) = \boxed{2}$

Well done