QUIZ 3

First name:

Last name:

Student number:

Recitation section:

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1. Find the antiderivative (indefinite integral) $\int \sin^4(x)\cos^3(x)\,dx$.

$$\int \sin^4(x)\cos^3(x)\,dx = \int \sin^4(x)\cos^2(x)\cos(x)\,dx$$

$$= \int \sin^4(x)(1-\sin^2(x))\cos(x)\,dx$$

Let $u = \sin(x)$, $du = \cos(x)dx$

$$= \int u^4(1-u^2)\,du$$

$$= \frac{u^5}{5} - \frac{u^7}{7} + C$$

$$= \frac{\sin^5(x)}{5} - \frac{\sin^7(x)}{7} + C$$

Note! Whenever you have a trig integral like this, you need to make sure you have one $\sin(x)$ or $\cos(x)$ leftover for your du.

2. Evaluate the integral $\int_0^1 te^{-2t}\,dt$.

$$\int_0^1 te^{-2t}\,dt$$

Use integration by parts with $u = t \Rightarrow du = dt$

$dv = e^{-2t}dt \Rightarrow v = \frac{-1}{2}e^{-2t}$

$$= u \cdot v \Big|_0^1 - \int_0^1 v\,du$$

$$= \frac{-te^{-2t}}{2}\Big|_0^1 - \int_0^1 \frac{-1}{2}e^{-2t}\,dt$$

$$= \left(\frac{-e^{2}}{2} - 0\right) + \frac{1}{2}\left(\frac{-1}{2}e^{-2t}\Big|_0^1\right)$$

$$= \frac{-1}{2e^2} + \frac{1}{2}\left(\frac{-1}{2}e^{-2} + \frac{1}{2}e^{0}\right)$$

$$= \frac{-1}{2e^2} - \frac{1}{4e^2} + \frac{1}{4}$$

$$= \frac{-3}{4e^{-2}} + \frac{1}{4}$$