Key

Quiz 5

This is a two-stage quiz. During the first stage, use your knowledge & calculator. You have 15 min. In the second stage, you are now welcome to use your books, notes, and students in the class to retake the same quiz. You have the remainder of the quiz time to write one solution (with everyone's name on it!!!) to be turned in for the group.

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

webwork 2 #1

1. [3] Find $\int \cos^2(x)\sin^3(x)\,dx$.

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

notation (+.5)

$u = \cos(x)$ $\qquad \sin^2 x + \cos^2 x = 1$ $\qquad = -\int u^2(1-u^2)\,du$

try method correctly (+1) $du = -\sin(x)\,dx$ $\qquad \sin^2 x = 1-\cos^2 x$ $\qquad = -\int u^2 - u^4\,du$

der/int & identity (+1) $-du = \sin x\,dx$

$= -\frac{1}{3}u^3 + \frac{1}{5}u^5 + C$ (+.5)

$= -\frac{1}{3}\cos^3(x) + \frac{1}{5}\cos^5 x + C$

IP Adv #2

2. [3] Find $\int x^{\frac{-1}{2}}\ln(x)\,dx$.

IP $\quad u = \ln x \qquad v = 2x^{1/2}$ (+.5) notation

$du = \frac{1}{x} \qquad dv = x^{-1/2}$ (+1) try method + did method correctly

(+1) derivatives + integrals

$(\ln x)\,2x^{1/2} - \int 2x^{1/2}\cdot\frac{1}{x}\,du$ (+.5)

$2\sqrt{x}\ln(x) - 2\int x^{-1/2}\,du = 2\sqrt{x}\ln(x) - 2\cdot 2x^{1/2} + C = 2\sqrt{x}\ln(x) - 4\sqrt{x} + C$

3. A particle has velocity $v(t) = te^{-t}$ meters per second.

§7.1 #75

(a) [2] What is the particle's acceleration at time t?

got it (+.5)

acceleration $= v'(t) = \frac{d}{dt}(v(t)) = t(-e^{-t}) + (1)e^{-t} = e^{-t} - te^{-t}\ \mathrm{m/s^2}$

(+.5) product rule (+1)

(b) [2] How far will the particle travel in the first t seconds?

ie find (+.5) $\int_0^T v(t)\,dt = \int_0^T te^{-t}\,dt$ $\qquad$ IP $\quad u = t \qquad v = -e^{-t}$

(+.5) $\qquad du = dt \qquad dv = e^{-t}\,dt$

(+1) $\int v(t)\,dt = -te^{-t} - \int -e^{-t}\,dt$

$= -te^{-t} + \int e^{-t}\,dt = -te^{-t} - e^{-t}$

eval at T and zero for FTC II

$(-Te^{-T} - e^{-T}) - (0e^{-0} - e^{-0})$

$1 - Te^{-T} - e^{-T}$