Math 221 Fall 2009
11/24/2009
Quiz #13

Name: Key

Show all work clearly and in order. Please box your answers. 10 minutes.

Evaluate the following:

[2] 1. $\frac{d}{dr}\int_0^r \sqrt{x^2}\,dx.$ = $\boxed{\sqrt{r^2}}$ (by the Fundamental Thm. of Calculus)

[2] 2. $\int_{10}^{10} \sin(\sin(x))dx.$ = $\boxed{0}$

[2] 3. $\int_0^1 (\sqrt{x}+x)^2 dx.$ = $\int_0^1 (\sqrt{x}+x)(\sqrt{x}+x)\,dx = \int_0^1 ((\sqrt{x})^2 + x\sqrt{x} + x\sqrt{x} + x^2)\,dx$

$= \int_0^1 (x + 2x\sqrt{x} + x^2)\,dx$

$= \int_0^1 (x + 2x\cdot x^{1/2} + x^2)\,dx$

$= \int_0^1 (x + 2x^{3/2} + x^2)\,dx$

$= \left[\frac{x^2}{2} + \frac{2x^{5/2}}{(5/2)} + \frac{x^3}{3}\right]_0^1 = \left[\left(\frac{1}{2}+\frac{4}{5}+\frac{1}{3}\right) - 0\right]$

$= \boxed{\frac{49}{30}}$

[2] 4. $\int_{\pi/4}^{\pi/3} \sec(\theta)\tan(\theta)d\theta.$

$= \left[\sec\theta\right]_{\pi/4}^{\pi/3}$

$= \sec(\pi/3) - \sec(\pi/4)$

$= \boxed{2-\sqrt{2}}$

[2] 5. $\int \frac{\cos(\pi/x)}{x^2}dx.$

Let $u = \frac{\pi}{x} = \pi x^{-1}$

$\frac{du}{dx} = \frac{-\pi}{x^2}$ so $dx = \frac{-x^2}{\pi}du$

$= \int \frac{\cos(u)}{x^2}\cdot\frac{-x^2}{\pi}\,du = -\frac{1}{\pi}\int \cos(u)\,du = \frac{-1}{\pi}\left[\sin(u)\right] + C$

$= \boxed{\frac{-1}{\pi}\sin\left(\frac{\pi}{x}\right) + C}$