Quiz #2 score_____/30 **Name** Key
Math 236
Spring 2008

SHOW WORK

1. Evaluate the following integral $\int \tan^{-1}(2x)\,dx$ 8 pts.

$u = \tan^{-1}(2x)$ $dv = 1\,dx$

$du = \frac{1}{1+[2x]^2}[2x]'\,dx$ $v = \int 1\,dx = x$

$= \frac{2}{1+4x^2}\,dx$

$= uv - \int v\,du$

$= x\tan^{-1}(x) - \int \frac{2x}{1+4x^2}\,dx$

$w = 1+4x^2$ $dw = 8x\,dx$

$= x\tan^{-1}(2x) - \frac{1}{4}\int \frac{8x}{1+4x^2}\,dx$

$= x\tan^{-1}(2x) - \frac{1}{4}\int \frac{1}{w}\,dw$

$= x\tan^{-1}(2x) - \frac{1}{4}\ln|1+4x^2| + C$

2. Evaluate the following integral $\int \frac{dx}{x^2\sqrt{4x^2-9}}$ 8 pts.

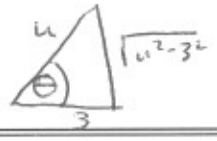
$u = 2x$ $\frac{1}{2}\int \frac{2\,dx}{(\frac{u}{2})^2\sqrt{(2x)^2-3^2}} = \frac{1}{2}\int \frac{1}{\frac{u^2}{4}\sqrt{u^2-3^2}}\,du = 2\int \frac{1}{u^2\sqrt{u^2-3^2}}\,du =$

$du = 2\,dx$

$u = 3\sec\theta$

$du = 3\sec\theta\tan\theta\,d\theta$

$\sqrt{u^2-3^2} = 3\tan\theta$



$= 2\int \frac{1}{9\sec^2\theta\, 3\tan\theta}\,3\sec\theta\tan\theta\,d\theta$

$= \frac{2}{9}\int \frac{1}{\sec\theta}\,d\theta = \frac{2}{9}\int \cos\theta\,d\theta = \frac{2}{9}\sin\theta + C$

$= \frac{2}{9}\frac{\sqrt{u^2-3^2}}{u} + C = \frac{2}{9}\frac{\sqrt{4x^2-9}}{2x} + C = \frac{1}{9}\frac{\sqrt{4x^2-9}}{x} + C$

3. Evaluate the following integral $\int \cos^4(x)\sin^3(x)\,dx$ 8 pts.

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

$= -\int u^4[1-u^2]\,du$ where $u = \cos(x)$, $du = -\sin(x)\,dx$

$= -\int u^4 - u^6\,du$

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

4. Evaluate the following integral $\int \sec^2(3x+1)\,dx$ 6 pts.

$u = 3x+1$

$du = 3\,dx$

$= \frac{1}{3}\int \sec^2(u)\,du = \frac{1}{3}\tan(u) + C$

$= \frac{1}{3}\tan(3x+1) + C$