MATH 17 – QUIZ 1
13 SEPTEMBER 2010

Name: Solution

NO CALCULATORS

Compute the following integrals.

1. $\int \frac{x}{x^2+1} \ln(x^2+1)\, dx$

Let $u = x^2+1$ $\quad du = 2x\, dx$

$\frac{1}{2}\int \frac{\ln u}{u}\, du$

Now let $v = \ln u$, $dv = \frac{1}{u}\, du$

$\frac{1}{2}\int v\, dv = \frac{1}{4}v^2 + C = \frac{1}{4}(\ln u)^2 + C = \boxed{\frac{1}{4}\left[\ln(x^2+1)\right]^2 + C}$

2. $\int \sin^2 x \cos^3 x\, dx$

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

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

Let $u = \sin x$ $\quad du = \cos x\, dx$

$\int u^2(1-u^2)\, du = \frac{u^3}{3} - \frac{u^5}{5} + C$

$= \boxed{\frac{\sin^3 x}{3} - \frac{\sin^5 x}{5} + C}$