MAT 1211.2 Quiz #1B
SOLUTIONS

#1

(A) $\int x^2\sqrt{1+x^3}\,dx$, Let $u = 1+x^3$
$\Rightarrow du = 3x^2\,dx$

$= \int \frac{1}{3}\sqrt{u}\,du$

$= \frac{1}{3}\cdot\frac{2}{3}u^{3/2} + C$ /4

$= \frac{2}{9}(1+x^3)^{3/2} + C$

OOPS

(C) $\int \frac{\ln^7 x}{x}\,dx$, Let $u = \ln x$
$\Rightarrow du = \frac{1}{x}\,dx$

$= \int u^7\,du$ /4

$= \frac{1}{8}u^8 + C$

$= \frac{1}{8}\ln^8 x + C$ {OR you can write this as $\frac{1}{8}(\ln x)^8 + C$}

(B) $\int \frac{\sec^2 x}{3+\tan x}\,dx$, Let $u = 3+\tan x$
$\Rightarrow du = \sec^2 x\,dx$

$= \int \frac{du}{u}$

$= \ln|u| + C$ /4

$= \ln|3+\tan x| + C$

(D) $\int x^7 \sqrt[4]{1+x^4}\, dx$ Let $u = 1+x^4$

$\Rightarrow du = 4x^3\, dx$

$= \int \frac{1}{4}(u-1)\, u^{1/4}\, dx$

$= \frac{1}{4}\int (u^{5/4} - u^{1/4})\, dx$

$= \frac{1}{4}\left(\frac{4}{9}u^{9/4} - \frac{4}{5}u^{5/4}\right) + C$ /5

$= \frac{1}{9}(1+x^4)^{9/4} - \frac{1}{5}(1+x^4)^{5/4} + C$

#2 Evaluate $\int_{-\pi}^{\pi} x^7 \cos x\, dx$ using symmetry.

Soln: Let $f(x) = x^7 \cos x$.

Then $f(-x) = (-x)^7 \cos(-x)$

$= -x^7 \cos x$ /3

$= -f(x)$

Sn $f(-x) = -f(x)$, meaning $f(x)$ is odd.

Thus $\int_{-\pi}^{\pi} x^7 \cos x\, dx = 0$.