Quiz 2 MAC-2312 Spring 2019 **Name:** Solution Key

To receive credit you MUST SHOW ALL YOUR WORK.

1. Evaluate each integral:

(a) (3 pts) $\int (\sec^2 x)\sqrt{1+3\tan x}\,dx$ =

sub $w = 1+3\tan x$

$dw = 3\sec^2 x\,dx$

$\frac{1}{3}dw = \sec^2 x\,dx$

($w = \tan x$ also works but you'd have to do a second substitution later on)

$$= \int \sqrt{w}\cdot\frac{1}{3}dw = \frac{1}{3}\int w^{\frac{1}{2}}dw = \frac{1}{3}\cdot\frac{2}{3}w^{\frac{3}{2}} + C = \frac{2}{9}\left(1+3\tan x\right)^{\frac{3}{2}} + C$$

(b) (4 pts) $\int x\sin(3x)\,dx$ =

I.B.P. $du = \sin(3x)\,dx$ $\quad v = x$

$u = \int \sin(3x)dx = -\frac{1}{3}\cos(3x)$ $\quad dv = dx$

$$= -\frac{1}{3}x\cos(3x) + \frac{1}{3}\int \cos(3x)\,dx$$

$$= -\frac{1}{3}x\cos(3x) + \frac{1}{3}\cdot\frac{1}{3}\sin(3x) + C$$

$$= -\frac{1}{3}x\cos(3x) + \frac{1}{9}\sin(3x) + C$$

(c) (4 pts) $\int \sin^3 x\cos^2 x\,dx = \int \sin^2 x\cos^2 x\cdot\sin x\,dx = \int (1-\cos^2 x)\cos^2 x\cdot\sin x\,dx =$

sub. $w = \cos x$

$dw = -\sin x\,dx$

$-dw = \sin x\,dx$

$$= \int (1-w^2)w^2\cdot(-dw) = -\int (w^2 - w^4)dw$$

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