

Math 122 HW #13

13.3 # 2, 6, 11, 25, 33

#2

$$\int \sin 5x \, dx$$

$$\begin{aligned} u &= 5x \\ du &= 5 \, dx \\ \frac{1}{5} du &= dx \end{aligned}$$

$$\begin{aligned} &= \int \sin u \cdot \frac{1}{5} du = \frac{1}{5} \int \sin u \, du = -\frac{1}{5} \cos u + C \\ &= \underline{\underline{-\frac{1}{5} \cos 5x + C}} \end{aligned}$$

#6

$$\int 2x \cos(x^2) \, dx$$

$$\begin{aligned} u &= x^2 \\ du &= 2x \, dx \end{aligned}$$

$$= \int \cos u \, du = \sin u + C = \sin x^2 + C$$

#11

$$\int 3\sqrt{\cos x} \sin x \, dx$$

$$\begin{aligned} u &= \cos x \\ du &= -\sin x \, dx \\ -du &= \sin x \, dx \end{aligned}$$

$$= \int 3\sqrt{u} \cdot -du = -3 \int u^{1/2} \, du = -3 \cdot \frac{2}{3} u^{3/2} + C$$

$$= -2(\cos x)^{3/2} + C$$

#25

$$\int -6x \cos 5x \, dx$$

$$u = -6x \quad du = -6 \, dx$$

$$dv = \cos 5x \, dx$$

$$v = \frac{1}{5} \sin 5x$$

$$\rightarrow = -6x \cdot \frac{1}{5} \sin 5x - \int \frac{1}{5} \sin 5x \cdot -6 \, dx$$

$$= -\frac{6}{5} \sin 5x + \frac{6}{5} \int \sin 5x \, dx \quad \text{like in #2}$$

$$= -\frac{6}{5} \sin 5x + \frac{6}{5} \cdot -\frac{1}{5} \cos 5x + C$$

#33

$$\int_0^{\pi/6} \tan x \, dx = -|\ln |\cos x||_0^{\pi/6} = -\ln |\cos \pi/6| - (-\ln |\cos 0|)$$

$$\cos 0 = 1$$

$$= -\ln \frac{\sqrt{3}}{2} + \ln 1$$

$$|\ln| = 0$$

$$\cos \pi/6 = \frac{\sqrt{3}}{2}$$

$$= -\ln \frac{\sqrt{3}}{2}$$

