MA 114 Quiz 1 August 29, 2019

Answer all questions and show your work. Unsupported answers may receive *no credit*. You may not use a calculator on this quiz. Allow 15 minutes for the quiz.

Name: _____ Section: _____

1. Find the following integrals.

   (a) (5 points) $\int z4^z dz$

Solution: Let $u = z$ and $dv = 4^z dz$. Then $du = dz$ and $v = \frac{1}{\ln 4}4^z$ and

$$\int z4^z dz = z\frac{1}{\ln 4}4^z - \int \frac{1}{\ln 4}4^z dz = \frac{z4^z}{\ln 4} - \frac{4^z}{(\ln 4)^2} + C$$

   (b) (5 points) $\int t^2 \sin(3t)dt$

Solution: Take $u = t^2$ and $dv = \sin(3t)dt$. Then $du = 2tdt$ and $v = \frac{-1}{3}\cos(3t)$ and we have

$$\begin{aligned}\int t^2 \sin(3t)dt &= t^2\frac{-1}{3}\cos(3t) - \int \frac{-1}{3}\cos(3t)2tdt \\ &= \frac{-t^2\cos(3t)}{3} + \frac{2}{3}\int t\cos(3t)dt\end{aligned}$$

Now we integrate by parts again with $u = t$ and $dv = \cos(3t)dt$. Then $du = dv$ and $v = \dfrac{1}{3}\sin(3t)$ and

$$\begin{aligned}\int t^2 \sin(3t)dt &= t^2\frac{-1}{3}\cos(3t) - \int \frac{-1}{3}\cos(3t)2tdt \\ &= \frac{-t^2\cos(3t)}{3} + \frac{2}{3}\left(\frac{t}{3}\sin(3t) - \int \frac{1}{3}\sin(3t)dt\right) \\ &= \frac{-t^2\cos(3t)}{3} + \frac{2t}{9}\sin(3t) - \frac{2}{27}\cos(3t) + C\end{aligned}$$