Math 2423-200 Quiz 7 Summer 2018

Name: Solution

Student Number:

Problem 1
Evaluate the following integrals.

(a) $\int_0^1 (x^e + e^x)\, dx$

$$\int_0^1 (x^e + e^x)\,dx = \frac{x^{e+1}}{e+1} + e^x \Big]_0^1$$

$$= \left(\frac{1}{e+1} + e\right) - (0 + 1)$$

$$= \frac{1}{e+1} + e - 1$$

(b) $\int_0^{1/4} \frac{dx}{1+16x^2}$ $= \int_0^{1/4} \frac{dx}{1+(4x)^2}$

let $u = 4x$

$du = 4\,dx$

$\frac{1}{4}\,du = dx$

$x = 0 \rightarrow u = 0$

$x = \frac{1}{4} \rightarrow u = 1$

$$\int_0^{1/4} \frac{dx}{1+16x^2} = \int_0^1 \frac{\frac{1}{4}\,du}{1+u^2} = \frac{1}{4}\cdot \tan^{-1}(u) \Big]_0^1$$

$$= \frac{1}{4}\left[\tan^{-1}(1) - \tan^{-1}(0)\right]$$

$$= \frac{1}{4}\cdot\left[\frac{\pi}{4} - 0\right] = \frac{\pi}{16}$$