Math 1161: Written Homework 7 Name: _____ .# _____

Due December 4, 2018 in recitation. TA: _____ Time: _____

Instructions. You may discuss this assignment with others, but you must submit your own write-up. Write clearly and legibly. All functions herein are real-valued functions of a single real variable.

1. Evaluate the following integrals.

   (a) (3 pts) $\int e^x \sin x \, dx$

   (b) (5 pts) $\int x e^x \sin x \, dx$

(continued on reverse)

2. (6 pts) Prove the following **secant reduction rule**:

   If $n > 1$ is an integer then

$$\int \sec^n x \, dx = \frac{\sec^{n-2} x \tan x}{n-1} + \frac{n-2}{n-1} \int \sec^{n-2} x \, dx.$$

   (Hint: Use integration by parts)

3. (6 pts) Suppose that the roots r, s, t of the polynomial

$$P(x) = (x-r)(x-s)(x-t)$$

   are distinct. (In other words $r \neq s$, $r \neq t$ and $s \neq t$).

   Find constants A, B, C in terms of r, s, t so that

$$\frac{1}{(x-r)(x-s)(x-t)} = \frac{A}{x-r} + \frac{B}{x-s} + \frac{C}{x-t}$$