

**Math 105 Assignment 3**  
Due the week of January 24

1. Calculate the definite integrals  $\int_0^{\frac{\pi}{4}} \tan^2 \theta \sec^3 \theta d\theta$ . (4 pts)

2. (a) Use integration by parts to calculate the definite integral (5 pts)

$$\int_{-1}^1 x^2 \sin x dx$$

(b) Is there any other simpler way to calculate the integral? (**Hint:** You do not need to find the antiderivative of the function.) (1 pt)

3. (a) What is the area between the graph of  $f(x) = \frac{e^x}{\sqrt{1-e^{2x}}}$  and the  $x$ -axis on the interval  $[\ln \frac{1}{2}, 0]$ ? (4 pts)

(b) What is the average of  $f(x)$  on this interval? (1 pt)