Name:

Math 10a
November 6, 2014
Quiz #8

1. (1 point) Is $e^x + e^{-x}$ an even function, an odd function, or neither?
   $f(x) = f(-x)$, so even.

2. (a) (2 points) $\displaystyle\int_0^\infty e^{-4x}dx$.

$$\lim_{R\to\infty}\int_0^R e^{-4x}dx = \lim_{R\to\infty} -e^{-4x}4\Big|_0^R = \frac{1}{4}.$$

   (b) (2 point) Suppose a probability density function is given by

$$f(x) = \begin{cases} 0 & x < 0 \\ Ce^{-4x} & x \geq 0 \end{cases}$$

   for some constant C. What must C be?
   If the total area is to be 1, then C must be 4.

3. (2 points) $\int x \ln(x) dx$

$$= \int \frac{d}{dx}\left(\frac{x^2}{2}\right) \ln(x) dx = \frac{x^2}{2}\ln(x) - \int \frac{x^2}{2}\frac{1}{x} = \frac{x^2}{2}\ln(x) - \frac{x^2}{4} + C.$$

4. (3 points) $\int_0^\pi x^2 \sin(x) dx.$

$$= \int_0^\pi x^2 \frac{d}{dx}(-\cos(x)) dx = -x^2\cos(x)\Big|_0^\pi + \int_0^\pi 2x\cos(x) dx$$

$$= \pi^2 + 2\int_0^\pi x\frac{d}{dx}(\sin(x)) dx = \pi^2 + 2\,x\sin(x)\Big|_0^\pi - 2\int_0^\pi \sin(x) dx = \pi^2 - 4.$$