

Wednesday January 23, 2008  
Math 1B

1. Find the derivative and antiderivative of the following functions:  $x^n$ ,  $e^x$ ,  $e^{2x}$ ,  $\cos x$ ,  $\sin 2x$ .

2. Find the following integrals. Problem 1 and the integration by parts formula will be helpful.

- a.  $\int x \cos x dx$

- b.  $\int \ln x dx$

- c.  $\int x^2 e^{2x} dx$

- d.  $\int e^x \sin 2x dx$

- e.  $\int \frac{\ln x}{x} dx$

3. Define  $\operatorname{erf}(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$ . Find  $\int \operatorname{erf}(x) dx$ .

4. a. Use integration by parts to prove the formula

$$\int (\ln x)^n dx = x(\ln x)^n - n \int (\ln x)^{n-1} dx.$$

b. Evaluate  $\int (\ln x)^3 dx$ .