

### Assignment 3

due: Monday, March 26, in class

**Problem 1:** Calculate the following integrals

a)  $\int x^n \ln x dx$

b)  $\int \frac{x+1}{x^2+2x+3} dx$

c)  $\int \frac{e^{2x}}{\sqrt{e^x+1}} dx$

**Problem 2:** Consider  $F(x) = \int_x^{x^2} \cos(xt) dt$ .

a) Calculate  $F(x)$  and differentiate wrt  $x$ .

b) Apply Leibniz' formula to find the derivative of  $F(x)$ .

**Problem 3:** Find the integral  $\int_1^a \left( \int_0^b \frac{1}{x^3} e^{y/x} dy \right) dx$  by

a) integrating over  $y$ , evaluating the integral in parentheses, and then integrating over  $x$ .

b) integrating first over  $x$ , evaluating, and then over  $y$ .

c) integrating over  $x$  and  $y$  (in the order you prefer) and then evaluating.

**Problem 4:** Find the integral  $\int_0^1 \int_0^1 |x - y| dx dy$ .