

# MATH 118 WINTER 2015 HOMEWORK 1

## DUE THURSDAY JAN. 15 3PM IN ASSIGNMENT BOX

QUESTION 1. (5 PTS) Let  $F(x)$  be differentiable on  $(a, b)$  and let  $c \in (a, b)$ . Assume that both  $\lim_{x \rightarrow c^+} F'(x)$ ,  $\lim_{x \rightarrow c^-} F'(x)$  exist and are finite. Prove that the two limits are equal.

QUESTION 2. (5 PTS) Let  $a, b \in \mathbb{R}$ ,  $b \neq 0$ , and  $\int f(x) dx = F(x) + C$ . Calculate  $\int_a^b f(bx) dx$  and justify your result.

QUESTION 3. (10 PTS) Calculate the following indefinite integrals. Please provide enough details, in particular those about the substitutions you made.

a) (2 PTS)  $\int \frac{(x+1)^3}{x} dx;$

b) (2 PTS)  $\int \frac{x}{x^2+1} dx;$

c) (2 PTS)  $\int \cot x dx;$

d) (2 PTS)  $\int \frac{dx}{\sqrt{x} + \sqrt[3]{x}};$

e) (2 PTS)  $\int \frac{dx}{1 + \cos^2 x}.$