MATH 171-10c, Assignment 11

Guidelines
Begin by answering the questions in the space provided; you may write on both sides of the paper. Additional sheets may be attached if necessary. Staple all sheets together before submission. Put down the names of all group members in the top right corner. Write neatly and legibly; untidy presentation may lead to appropriate penalization.

Due: Friday, April 16th

1. (10 marks) Compute
\[ \lim_{x \to 0^+} (1 - \cos x)^{\frac{1}{x}}. \]

2. (10 marks) Determine the value of the real number \( b \) for which
\[ \lim_{x \to \infty} \left( \frac{x - b}{x + 2b} \right)^x = \frac{2}{3}. \]

3. Consider the function
\[ f(x) = x^3 - |x| + |2x - 7|, \quad -\infty < x < \infty. \]
   (i) (10 marks) Determine all the critical numbers of \( f \).
   (ii) (10 marks) Determine the intervals in which \( f \) is nondecreasing, and those in which it is nonincreasing.
   (iii) (5 marks) Determine the absolute maximum value of \( f \) in the interval \([0, 2]\).