Math 227 HW2 due on Friday, Jan. 19 at beginning of class

Non-textbook problems are worth more than textbook problems.

1. Section 11.3: 13, 17, 24, 25, 27

2. Find the unit tangent \( T \), the unit principal normal \( N \) and the curvature \( \kappa \) at all points of the parameterized curves in problems 24 and 25 of section 11.3.

3. Let \( C \) be the curve \( \{(x, y) : y = x^{1/3}, x \in \mathbb{R}\} \).
   (a) Find a \( C^1 \) but non-smooth parameterization of \( C \).
   (b) Find a smooth parameterization of \( C \).
   (c) Is \( C \) a smooth curve? Why or why not?

4. Let \( C \) be the curve \( \{(x, y) : y = |x|, x \in \mathbb{R}\} \).
   (a) Find a \( C^1 \) parameterization of \( C \).
   (b) Show that \( C \) is not a smooth curve.