1. Give an example of a function that is defined everywhere but has at least one discontinuity.

2. Give an example of a function that is everywhere continuous but not everywhere differentiable.

3. Differentiate the following functions:
   (a) \( \sqrt{1 + x^3} \)
   
   (b) \( \sin(x)/x \)
   
   (c) \( \arctan(x) \)

4. Compute the following integrals:
   (a) \( \int \sin(x) \, dx \)
   
   (b) \( \int 2xe^{x^2} \, dx \)
   
   (c) \( \int_0^5 e^{-x} \, dx \)