MATH 10B with Prof. Stankova
Section #209 ; time: 3:30-5pm
GSI: Ninh DO

Quiz 9

Student:
SID:
Tue 4/2/19

True/False - No explanation needed. (1pt for correct, 0pt - no answer, -1pt - incorrect)

1. The CDF of a continuous RV is always continuous in the range of that RV. True/False
   True. It may not be smooth, but it is continuous over the RV range.

2. The maximum value of a PDF can exceed 1. True/False
   True. Say, $Uniform(10, 10.1)$

Problems - Need justification. No justification means **zero**!

1. (10pts) Given a function $f(x) = c(4 - x^2)$ for $-2 \leq x \leq 2$ and $f(x) = 0$ otherwise.
   a) Find c so that $f(x)$ is a PDF of a RV X.
   b) Find CDF of X.

   a) $1 = \int_{-2}^{2} f(x)dx = \int_{-2}^{2} c(4 - x^2)dx = c\left(4x - \frac{x^3}{3}\right)\Big|_{-2}^{2} = \frac{32c}{3} \Rightarrow c = \frac{3}{32}$

   b) $\int_{-\infty}^{x} f(s)ds = \int_{-2}^{x} \frac{3}{32}(4 - s^2)ds = \frac{3}{32}\left(4s - \frac{s^3}{3}\right)\Big|_{-2}^{x} = -\frac{x^3}{32} + \frac{3x}{8} + \frac{1}{2}$

   Thus, CDF of X is $F(x) = -\frac{x^3}{32} + \frac{3x}{8} + \frac{1}{2}$ for $-2 \leq x \leq 2$, $F(x) = 0$ for $x < -2$ and $F(x) = 1$ for $x > 2$