MATH 10B with Prof. Stankova
Section #208 ; time: 2-3:30pm
GSI: Ninh DO

Quiz 9 Solution

Student:
SID:
Tue 4/2/19

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

1. The PDF of a continuous RV is always continuous in the range of that RV. True/False
   False. You can define PDF what whatever you want as long as it satisfies the conditions to be a PDF. Say, $X \sim Uniform(0, 0.5)$ for $0 \leq X < 0.5$, and $X \sim Uniform(1, 1.5)$ for $0.5 \leq X \leq 1$, then the PDF of X is a piecewise Uniform.

2. The maximum value of a PDF cannot exceed 1. True/False
   False. Say, $Uniform(10, 10.1)$

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

1. (10pts) Given a function $f(x) = cx(1-x)$ for $0 \leq x \leq 2$ 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) $1 = \int_0^2 f(x)dx = \int_0^2 cx(1-x)dx = c\left(\frac{x^2}{2} - \frac{x^3}{3}\right)\Big|_0^2 = -\frac{2c}{3} \Rightarrow c = -\frac{3}{2}$

   b) $\int_{-\infty}^{x} f(s)ds = \int_0^x -\frac{3}{2}s(1-s)ds = -\frac{3}{2}\left(\frac{s^2}{2} - \frac{s^3}{3}\right)\Big|_0^x = \frac{x^3}{2} - \frac{3x^2}{4}$

   Thus, CDF of X is $F(x) = \frac{x^3}{2} - \frac{3x^2}{4}$ for $0 \leq x \leq 2$, $F(x) = 0$ for $x < 0$ and $F(x) = 1$ for $x > 2$