Dr Gross / STA 3154 **Midterm # 2** **Nov 22, 2017**

This exam is due on Monday November 27 at 10:45 in class

1. The duration of a summer shower in minutes is found to be a random variable X with a Cumulative Distribution Function

$$F(x) = .4\,(1- e^{-x/3}) + .6\,[1 - (1+ x/5)\, e^{-x/5}] \quad \text{if} \quad x > 0.$$

a. Show that F is indeed a cumulative distribution function, and determine the probability density cumulative function f(x) of X. *Don't forget its* ***support****. (those values x for which f(x)>0). Check all assumptions!*

b. The density you obtained is a 40% to 60% mixture of two well-known distributions. What are they? Include their parameters in your description.

c.

i. What is the conditional probability that a shower will last over 9 minutes, given that it has already lasted over 6 minutes? Use F as given above.

ii. What is the probability that a shower lasts exactly 2 minutes?

iii. What is the probability that a shower lasts between 4 and 7 minutes? Do the minimum amount of work!

iv.--Find the expected value of the duration X of a shower in minutes. ***Hint:*** *Use the pdf which is a weighted sum of two densities whose means you know.*