Mathematics 1550H – Probability I: Introduction to Probability

TRENT UNIVERSITY, Summer 2020 (S62)

Assignment #3

(Un)expected Values?

Due on Friday, 17 July.

Please submit your solutions using Blackboard's assignment module. If that fails, please email your solutions to the instructor (`sbilaniuk@trentu.ca`*). Scans or photos of handwritten solutions are perfectly acceptable, so long as they are legible and in some common format. (Combined into a single pdf, for preference.)*

Consider the probability density function $f(x) = \dfrac{1}{\pi} \cdot \dfrac{1}{1+x^2}$.

1. Verify that $f(x)$ is a valid probability density function. *[4]*

2. Suppose the continuous random variable X has $f(x)$ as its density function. Show that $E(X)$ is undefined. *[2]*

3. Find an example of a probability density function $g(x)$ such that if a continuous random variable X has $g(x)$ as its density function, then $E(X)$ is defined but $V(X)$ is not. *[4]*