Mathematics 1550H – Introduction to probability

TRENT UNIVERSITY, Summer 2014

Assignment #4

Unexpected Value!?

Due on Monday, 21 July, 2014.

The function $f(x) = \dfrac{1}{\pi\,(1+x^2)}$ is an unfortunate one for those who hoped continuous random variables would behave themselves. On the one hand:

1. Verify that $f(x)$ is a probability density function. *[5]*

2. Show that if the random variable X has $f(x)$ as its probability density function, then X does not have a well-defined expected value. *[5]*

Hint: Try computing $E(X)$ and see if you actually get a number ...

Bonus. Find a function $g(x)$ such that a random variable X which has $g(x)$ as its probability density function does have a well-defined expected value $E(X)$, but does not have a well-defined variance $V(X)$. *[2]*