Mathematics 1550H – Introduction to probability
TRENT UNIVERSITY, Winter 2018
Assignment #5
Simulating coins.
Due on Friday, 16 February.

1. You are stuck on a desert island with a friend and single coin which is your only source of randomness. [Deterministic desert islands are very boring!] The coin in question is biased in that it comes up heads more often than tails, though you do not know the exact bias. (It does come up tails some of the time.) You and your friend want to play a game that needs a fair coin. How can you use the biased coin to simulate the fair coin that you need? *[5]*

2. Having been rescued, you and your friend get stuck on another desert island with a single coin, but this time it's a coin that is known to be fair. Having gotten bored of the game needing a fair coin on the last desert island adventure, you and your friend would like to play a game that requires a biased coin, in particular, a coin with $P(H) = 0.6$ and $P(T) = 0.4$. How can you use the fair coin to simulate the biased coin you need? *[5]*

For One Who Loves An Engineer

Sing not to me of silicon chips
The chocolate kind are sweeter
But sweeter still would be your lips –
Put down that voltage meter!

A jug of wine (viscosity 3),
Loaf of bread (shear modulus 7)
But me you cannot quantify –
Oh, glory be to heaven!

Miriam Nadel

Mathematicians are like lovers. ... Grant a mathematician the least principle, and they will draw from it a consequence which you must also grant, and from this consequence another.

Bernard le Bovier Fontenelle