

Mathematics 1550H – Introduction to probability

TRENT UNIVERSITY, Summer 2013

Assignment #3

Fairness from bias

Due on Wednesday, 17 July, 2013.

1. You are given a biased coin which comes up heads $\frac{2}{3}$ of the time and tails $\frac{1}{3}$ of the time. What you would like to have is a fair coin. How can you use the biased coin to deliver an event which has a probability of $\frac{1}{2}$? (You may toss the biased coin as many times as necessary for whatever process you devise.) [10]

MATH CHRISTMAS CAROLS?

Just a little out of season!

First, to the tune of *Santa Claus Is Coming To Town*:

Oh, better take care completing the square;
You'd better not try dividing by y ;
January exams are coming to town.
We're making a list, don't shake in your boots;
Just watch out for extraneous roots.
January exams are coming to town.
You know you'll have quadratics
And exponentials too,
You rationalize denomi-
Nators like root two.
So, you'd better be bright and calculate right,
You'd better check roots for one that suits;
January exams are coming to town.

Second, to the tune of *Rudolph The Red-Nosed Reindeer*:

Zero, that funny cipher, has a shape that looks like "O,"
And if you want to use it, there are things you need to know.
Never divide by zero; if you do, you will be sad,
Getting a crazy answer, making your report look bad.
But treat zero as your friend – use him carefully –
"Safe to multiply and add" – That's the rule for zero, lad!
Zero, that screwball number wants to be a comrade true,
But never divide by zero, or **you'll be getting zero, too!**

I don't know who wrote these lyrics, but I'd like to thank Melanie Goncalves for letting me have a copy of these and several other math take-offs on popular Christmas songs.