

Mathematics 3770H – Complex Analysis

TRENT UNIVERSITY, Winter 2022

Assignment #7 – Constant function?

Due on Friday, 11 March.

(May be submitted on paper or via Blackboard.)*

As with all the assignments in this course, unless stated otherwise on the assignment, you are permitted to work together and look things up, so long as you acknowledge the sources you used and the people you worked with.

1. Suppose the entire function $f(z)$ has real and imaginary parts $u(z)$ and $v(z)$, *i.e.* $f(z) = u(z) + iv(z)$ for functions u and v from \mathbb{C} to \mathbb{R} , and that $u(z)$ is bounded on \mathbb{C} , *i.e.* for some $M > 0$, we have $|u(z)| \leq M$ for all $z \in \mathbb{C}$. Find such a function $f(z)$ that is not constant or show that any such function $f(z)$ must be constant. [10]

Hint: You might want to consider what $e^{f(z)}$ would be like for such a function $f(z)$.

MATH CHRISTMAS CAROLS?

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; a long-ago student named Melanie Goncalves gave me have a copy of these and several other math take-offs on popular Christmas songs.

* All else failing, please email your solutions to the instructor at: sbilaniuk@trentu.ca