

# Mathematics 3790H – Analysis I: Introduction to analysis

TRENT UNIVERSITY, Fall 2010

## Assignment #3

Due on Thursday, 21 October, 2010.

### A slice of $\pi$

1. Verify that  $\sum_{n=0}^{\infty} \frac{1}{16n^2 + 16n + 3}$  converges absolutely. [4]

2. Show that  $\sum_{n=0}^{\infty} \frac{1}{16n^2 + 16n + 3} = \frac{\pi}{4}$ . [6]

*Hint:* Start with the Taylor series at 0 of  $\arctan(x)$  and use the fact that  $\arctan(1) = \frac{\pi}{4}$ . You'll need to do a little algebra, too.

### 3.14159/Pi

Jenny Jenny, look at that homework;  
I see your method, and I'm afraid it won't work.  
You study hard, but now you've reached the stage  
Where you're just staring at the circles on the page.

Jenny, what is this number?  
Tell me how it's defined.  
Jenny, plug in this number:  
Three point one four one five nine.  
(Three point one four one five nine.)  
Three point one four one five nine.  
(Three point one four one five nine.)

Jenny Jenny, you should know better;  
This is not just another Greek letter.  
It's a term that relates two important parameters;  
If you know the circumference, you can find the  
diameter.

Jenny, you need this number;  
You should keep it in mind.  
Jenny, plug in this number:  
Three point one four one five nine.  
(Three point one four one five nine.)  
Three point one four one five nine.  
(Three point one four one five nine.)

You got it, you got it, you got it!  
You got the answer – take a look.  
You got it, you got it, you got it!  
It's in the back – it's in the back of the book.

Jenny, what is this number?  
Tell me how it's defined.  
Jenny, plug in this number:  
Three point one four one five nine.  
(Three point one four one five nine.)  
Three point one four one five nine.  
(Three point one four one five nine.)

Jenny Jenny, look at these problems.  
(Three point one four one five nine.)  
Aren't you glad you know how to solve them?  
(Three point one four one five nine.)  
Three point one four one five nine.  
(Three point one four one five nine.)  
[repeat and fade]

This parody by Greg Crowther is to be sung to the tune of 867-5309/Jenny, by A. Call and J. Keller, as performed by Tommy Tutone. You can find this parody, among other songs, at:

<http://faculty.washington.edu/crowther/Misc/Songs/>