

# MATH 162 EXTRA CREDIT ESSAY

(MARCH 2018)



**“When I said you could write a paper for extra credit,  
I was open to almost anything ...  
and then you handed in ‘Fifty Million Cajillion Ways I Hate Dogs’.”**

1. What is the relation of the harmonic series to music? Develop this theme.
2. Discuss the origin of the concept of logarithm. Should astronomers be given credit for developing this idea first?
3. Choose one or two ideas in the mathematics of gambling and develop them.
4. How are infinite series useful in solving differential equations? Give applications.
5. Which specialties in medicine require knowledge of calculus, differential equations and physics? Develop these thoughts.
6. Discuss the “[Tristram Shandy paradox](#)” How does this compare with Zeno’s paradox? Discuss related paradoxes such as the “barber paradox”.

7. Discuss the ideas inherent in the paradox of Hilbert's hotel. You may wish to read Vilenkin's account of the extraordinary hotel.  
<https://yakovenko.files.wordpress.com/2011/11/vilenkin1.pdf> (pages 39 – 47)
8. The great Argentine writer [Jorge Luis Borges](#) was fascinated by the infinite. Read several of the short stories in Borges' **Labyrinths: Selected Stories and Other Writings**. Discuss the relationship between the study of the infinite in the differential calculus and Borges' vision of the infinite. Alternatively, write a short story in the style of Borges that engages the reader in a particular encounter with the differential calculus.



I amass countless numbers,  
I pile millions into a mountain,  
I pour time in a heap,  
Ranges of innumerable worlds.  
When I look at you  
From a reckless height,  
Then I see that you are  
Far above all numbers and measures:  
They are just part of you.

- [Albert von Haller](#) (1708 – 1777)