**Due: May 7th at 11:59PM**

## Instructions

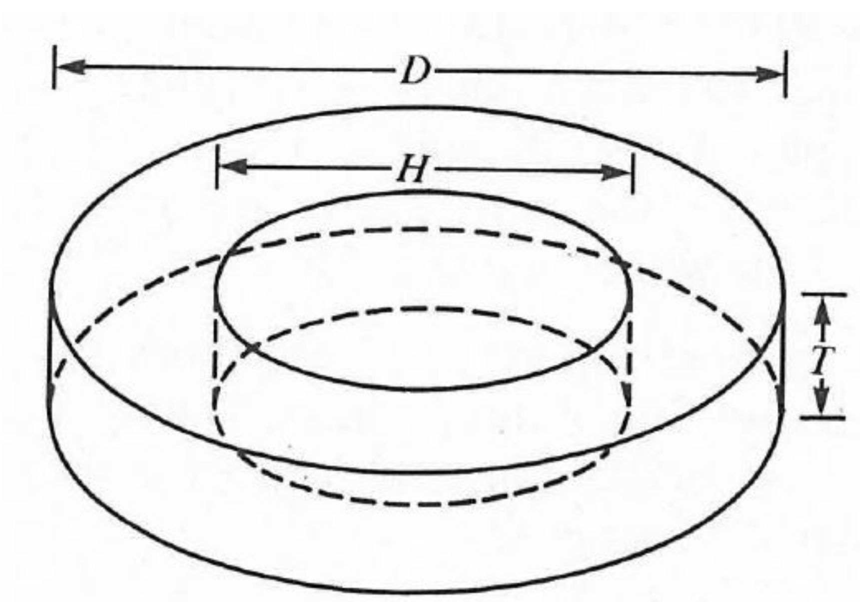
- Complete the following exercises on sperate sheets of paper. Scan your solutions and upload a PDF document. The file should have the following naming convention:

“Last Name First Name Assignment Name.pdf”
“Albright Charles Exam 3.pdf”

- Make sure your pages are numbered in the lower right-hand corner.
- Make sure each page has your full name and the name of the assignment in the upper right-hand corner of each page.
- **Note:** You do not need to include this page in your solutions.

## Solutions

- Because of the unique circumstances of our situation, take special care with your solutions. Make sure they are complete, organized, clear and thorough. Error on the side explaining too much.
- Your final answer should be simplified and exact.
- Graphs should be clear, legible and labeled.



1. THE SERIES $\sum_{k=0}^{\infty} \frac{1}{k^2+1}$ CONVERGES.

SHOW THE SERIES CONVERGES USING AS MANY SERIES TESTS AS POSSIBLE. IF A TEST DOESN'T APPLY EXPLAIN WHY. IF A TEST IS INCONCLUSIVE, JUST SAY SO.

2. CALCULATE THE FOLLOWING LIMITS

(a) $\lim_{k\to\infty} \sqrt[k]{k}$ (b) $\lim_{k\to\infty} \left[\frac{k}{k+1}\right]^k$

3. DETERMINE WHICH OF THE FOLLOWING SERIES CONVERGES OR DIVERGES.

(a) $\sum_{k=10}^{\infty} \frac{(\sqrt{k}+2)^3}{(\sqrt{k}-2)^6}$ (b) $\sum_{k=1}^{\infty} \cot^{-1}(k)$

(c) $\sum_{k=5}^{\infty} \frac{(-1)^{k+1}(k^2+1)}{(k^2-2)}$ (d) $\sum_{k=1}^{\infty} (-\tan^{-1}(-k))^k$

(e) $\sum_{k=1}^{\infty} \frac{\sqrt{k}-1}{k^3 \ln k}$ (f) $\sum_{k=3}^{\infty} \frac{\ln(k)}{k}$

(g) $\sum_{k=1}^{\infty} \frac{(-1)^{k+2}(5k^2+3)(4k)!}{(2k^2+3k-1)(4k)^{4k}}$ (h) $\sum_{k=2}^{\infty} \frac{(-1)^{k-1}}{\sqrt[3]{\ln k}}$

4. DETERMINE IOC FOR $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^k (k+1)}{(2k)^2\, 2^k}(x-2)^k$

5. FIND A POWER SERIES REPRESENTATION FOR THE FUNCTION $f$ DEFINED BY

$$f(x) = \frac{1}{2x - x^2}$$

CENTERED AT $a = 1$. DETERMINE IOC FOR YOUR REPRESENTATION

6. USE THE MCLAURIN SERIES FOR ARCSIN$x$ TO GENERATE A POWER SERIES FOR $\pi/3$. USE THIS POWER SERIES TO GENERATE A FRACTION THAT IS WITHIN $\frac{1}{10{,}000}$TH ON THE EXACT VALUE OF $\pi/3$.