Math 32B - Lecture 4
Winter 2021
Midterm 1
Due 1/28/2021 before 10am

Sign and submit the following honor statement:

> *I certify on my honor that I have neither given nor received any help, or used any non-permitted resources, while completing this evaluation.*

Signed:

Print name:

This exam contains 5 pages (including this cover page) and 4 problems. There are a total of 30 points available.

- Attempt all questions.
- Solutions must be uploaded to Gradescope before 10am Pacific Time on January 28^{th}.
  - Include extra pages as you need them.
  - You may complete the problems on a printout of this exam, blank paper, or a tablet/iPad.
  - If you handwrite your solutions, please make sure your scan is clearly legible.
  - Solutions should be written clearly, in full English sentences, defining all variables, showing all working, and giving units where appropriate.
- The work submitted must be entirely your own: you may not collaborate or work with anyone else to complete the exam.
- This exam is open book. You may use your notes, the textbook, and any online resource that does not involve interaction with another person.
- **Posting problems to online forums or "tutoring" websites counts as interaction with another person so is strictly forbidden.**

1. (4 points) Let $\mathscr{W} = [0,1] \times [1,2] \times [2,3]$. Find

$$\iiint_{\mathscr{W}} xyz \, dV$$

2. (8 points) Evaluate

$$\int_0^1 \int_{\sin^{-1}(y)}^{\frac{\pi}{2}} e^{\cos(x)}\, dx\, dy.$$

You should assume that $\sin^{-1}(y)$ has range $[-\frac{\pi}{2}, \frac{\pi}{2}]$.

(*Hint:* *At some point in your solution, it might be useful to use the substitution* $u = \cos x$.)

3. (10 points)

   (a) Let $\mathscr{D}$ be the region in the (x, y)-plane bounded by $x = 0$, $y = e^x - 1$, and $y = 1$. Use a double integral to compute the area of $\mathscr{D}$.

   (b) Let $\mathscr{W}$ be the $3d$ region above $\mathscr{D}$ and below the surface $z = 1 - y$. Use a triple integral to compute the volume of $\mathscr{W}$.

4. (8 points) Let $\mathscr{D}$ be the region where $-2 \leq x \leq y \leq 0$ and $x^2 + y^2 \geq 1$. Evaluate

$$\iint_{\mathscr{D}} (x^2 + y^2)^{-\frac{3}{2}} \, dA.$$