Name: ______________________________

APPM 1350
Summer 2024

Exam 2

June 28

Instructions:

- Write your name at the top of each page.
- Show all work and simplify your answers, except where the instructions tell you to leave your answer unsimplified.
- Be sure that your work is legible and organized.
- Name any theorem that you use and explain how it is used.
- Answers with no justification will receive no points unless the problem explicitly states otherwise.
- Notes, your text and other books, calculators, cell phones, and other electronic devices are not permitted, except as needed to upload your work.
- When you have completed the exam, upload it to Gradescope. Verify that everything has been uploaded correctly and pages have been associated to the correct problem before you leave the room.
- Turn in your hardcopy exam before you leave the room.

Half / Double Angle Formulas

- $\sin(2\ ) = 2\sin(\ )\cos(\ )$
- $\cos(2\ ) = \begin{cases} \cos^2(\ ) - \sin^2(\ ) \\ 1 - 2\sin^2(\ ) \\ 1 + 2\cos^2(\ ) \end{cases}$
- $\tan(2\ ) = \frac{2\tan(\theta)}{1-\tan^2(\theta)}$
- $\sin\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1}{2}(1 - \cos(\ ))}$
- $\cos\left(\frac{\theta}{2}\right) = \pm\sqrt{\frac{1}{2}(1 + \cos(\ ))}$
- $\tan\left(\frac{\theta}{2}\right) = \begin{cases} \pm\sqrt{\frac{1-\cos(\theta)}{1+\cos(\theta)}} \\ \frac{\sin(\theta)}{1+\cos(\theta)} \\ \frac{1-\cos(\theta)}{\sin(\theta)} \end{cases}$

Angle Sum / Difference Formulas

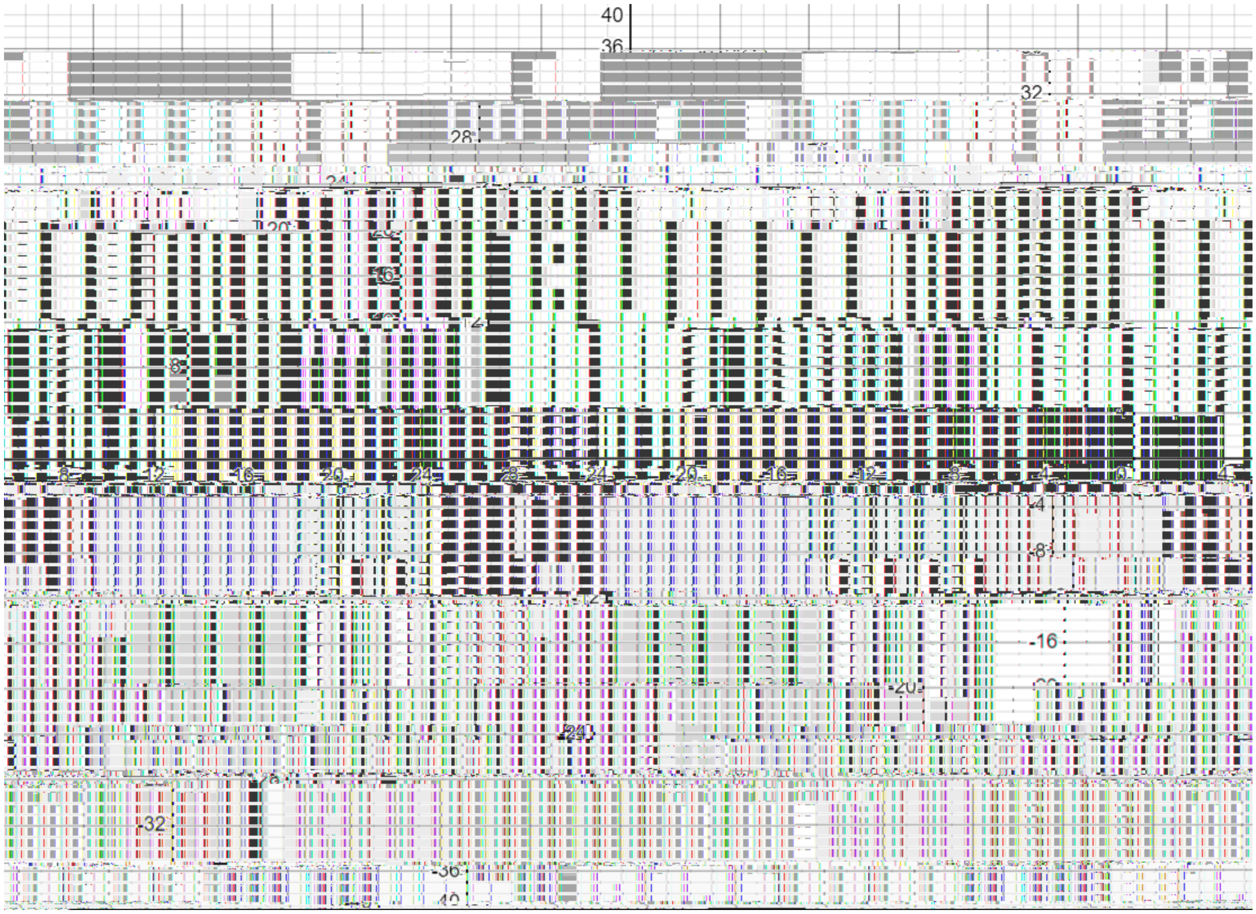
- $\sin(\ \pm\ ) = \sin(\ )\cos(\ ) \pm \sin(\ )\cos(\ )$
- $\cos(\ \pm\ ) = \cos(\ )\cos(\ )\ \ \sin(\ )\sin(\ )$
- $\tan(\ \pm\ ) = \frac{\tan(\alpha) \pm \tan(\beta)}{1\ \ \tan(\alpha)\tan(\beta)}$

1. (40 pts) The following problems are not related.

   (a) Find $\frac{dy}{dx}$ if $x\cos(y) + y^3 = \quad {}^{3=2}$. You should solve for $\frac{dy}{dx}$, but you do not need to simplify your answer further.

   (b) Use linearization to estimate $(8{:}01)^{2=3}$. You do not need to simplify your answer.

   (c) Show that $f(x) = x^2 - 3x - 5$ satisfies the three hypotheses of Rolle's Theorem on the interval $[-2; 5]$



THIS IS THE END OF THE EXAM