

MATH 104 HOME WORK PRACTICE MIDTERM 1

NAME (PRINTED):

TA:

RECITATION TIME:

Please *turn off all electronic devices*. You may use both sides of a 8.5×11 sheet of paper for notes while you take this exam. No calculators, no course notes, no books, no help from your neighbors. **Show all work**, even on multiple choice or short answer questions—the grading will be based on your work shown as well as the end result. Please **clearly mark** a multiple choice option for each problem. Remember to put your name at the top of this page. Good luck.

My signature below certifies that I have complied with the University of Pennsylvania's *code of academic integrity* in completing this examination.

Your signature

Problem	Score (out of)
1	(10)
2	(10)
3	(10)
4	(10)
5	(10)
6	(10)
7	(10)
Total	(70)

1. (10 pts) Use the integrating factor method to solve the following D.E.

$$y' = x + y$$

2. (10 pts) Let $f(x)$ be a solution to the IVP $y' = x + y$ and $y(1) = 1$. Use Euler's method and a step size of $h = \frac{1}{4}$ to estimate $f(2)$.

3. (10 pts) Evaluate

$$\int \cos^4(x) dx$$

4. (10 pts) Evaluate

$$\int \frac{1}{x^2\sqrt{x^2-1}} dx$$

5. Find the following limit using Taylor Series AND L'Hospital's rule

$$\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$$

6. (10 pts) Evaluate

$$\int \cos(x)e^x dx$$

7. (10 pts) The population of a town on year t is modeled by the following IVP where $t = 0$ is the current year.

$$y' = \frac{y}{10} \left(1 - \frac{y}{1000}\right)$$

$$y(0) = 100$$

Find the population of the town in 20 years.