Math 26A
Spring 2021
60 minutes

Name (Print): _____

Instructions:

- The exam is open book and open notes. You may not receive assistance from other people, including through forums or Q&A sites.
- You may use any kind of calculator you like, but you must show each step of your work. You are expected to use methods from this course on this exam. *You will receive a zero for correct solutions with no work shown.*
- For incorrect solutions, partial credit will be awarded for work shown.
- You may submit your exam in the same manner as your homework.
- You are welcome to print this exam and write on it directly or to work on a separate piece of paper.
- Round any numeric results to 4 decimal places.

1. Find the critical number(s) and the open intervals on which the function is increasing or decreasing

   $$f(x) = 2x^2 + 7$$

2. Find all relative extrema of the function

   $$g(x) = 2x^3 - 5x^2 + 2x + 8$$

3. Find the point(s) of inflection for the graph of

   $$h(x) = 2x^4 - 2x + 25$$

4. Find the two positive numbers x and y such that $2x + \frac{y}{2} = 4$ and their product is a maximum.

5. Find all asymptotes (vertical and horizontal) of the function

$$y = \frac{4x^2 + 7}{2x^2 - 8}$$

6. Find the derivative of the function

$$f(x) = \frac{1}{3}x^3 e^{-2x}$$

7. Find the derivative of the function

$$g(x) = \log_3(2x - 1)$$

8. Superman is hanging out on Earth, blissfully unaware that a super villain on Krypton is planning to send a batch of 10 grams of kryptonite to Superman's house. Fortunately for Superman, the super villain forgot that Earth is really far away. Traveling at 1/1000th the speed of light, the kryptonite will arrive on Earth in approximately 50,000 years. If the main element in kryptonite has a half life of 250,000 years, how much will remain by the time the kryptonite reaches Earth?

   Hint: For a starting weight of 10g and a half life of 250,000 years, find the amount remaining after 50,000 years. Use the equation $y = Ce^{kt}$.