YOUR NAME:

YOUR TA’s NAME AND SECTION NUMBER:

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1. (20 points) Find positive numbers $x$ and $y$, whose sum is 75, such that $xy^2$ is maximized.
2. (20 points) Find the Taylor series of the function

\[ f(x) = \ln(1 - 5x) \]

and find its radius of convergence.
3. (20 points) The rate of a continuous money flow starts at $1000 and increases exponentially at 5% per year for 3 years. Find the accumulated amount of money flow if the interest earned is 11% compounded continuously.
4. (20 points) Consider the differential equation

\[
\frac{dy}{dx} - 2xy - 4x = 0; \quad y(1) = 20.
\]

a) Solve this differential equation.

b) Apply one step of Euler’s method with step size 0.1 to approximate the value of y at x = 1.1.
5. (20 points) Compute the following limit:

\[
\lim_{{x \to 0}} \frac{5e^x - 5}{{x^3} - 8x^2 + 7x}
\]