

YOUR NAME: _____

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Compute the derivatives of the following functions:

(a) $f(x) = e^x \ln(x + 1)$

(b) $f(x) = \sqrt{e^{2x} + 4}$

2. Compute the indefinite integrals:

(a) $\int (1 + 10x)\sqrt{x} dx$

(b) $\int \frac{(x - 1)(x + 3)}{x^2} dx$

3. Find the area of the region bounded by the graphs of $y = e^{3x} - e$, $y = 0$ and $x = 0$.

4. Find the area of the region bounded by the graphs of $y = x^2$ and $y = x^3$.

5. Find the average value of the function $f(x) = \frac{x^2 - 1}{x^3 - 3x}$ in the interval $[1, e]$.