

Serial No:

Student No.:

Name:

- 1. SHOW ALL WORK. NO CREDITS FOR ANSWERS NOT SUPPORTED BY WORK.**
2. CALCULATORS ARE NOT ALLOWED.

1. (15 Points) A rectangular box has a square base with edges at least 1 in. long. It has no top, and the total area of its five sides is 300 in.^2 . What is the maximum possible volume of such a box?
2. (15 Points) The demand equation of a certain product in a company is $p = 400 - 2q$ and the average cost per unit of producing q units is $\bar{c} = q + 160 + \frac{2000}{q}$ where p and \bar{c} are in dollars per unit. Find the maximum profit that the company can achieve.
3. (15 Points) Use differentials to approximate $\sqrt[4]{16.8}$
4. (60 Points: 10 points each) Evaluate each of the following integrals.
- a) $\int \frac{x^2 - \sqrt{x}}{x^3} dx$
- b) $\int \sqrt{\frac{1}{e^x}} dx$
- c) $\int \frac{x}{\sqrt[3]{2x^2 + 9}} dx$
- d) $\int \frac{\ln xe^x}{x} dx$
- e) $\int_1^2 \left(\frac{d}{dx} \int_1^2 e^{x^2} dx \right) dx$
- f) $\int_5^5 \frac{(x+2)}{x + \ln \sqrt{5x+3}} dx$
5. (15 Points) Given that $y'' = x + e^{2x}$, $y'(0) = 2$, and $y(0) = 3$. Find y .
6. (15 Points) Find the area between the graph of $y = x^2 - x - 2$ and the x -axis from $x = -2$ to $x = 2$.

7. (15 Points) Find the area bounded by the curves of $y = 2x + 2$ and $y = x^2 - 1$.