

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. In 2014, your uncle, having won the Super-Duper-Million Lottery, purchased a historic baseball card at auction for \$3.5 Million. The auction house claimed that the value of that particular card had been rising every year by approximately 10%. Can you help your uncle estimate what the value of the card had been in 1990, the date when the baseball player shown in the card passed?
2. A company finds that x days after the conclusion of an advertising campaign the daily sales of a new product are $S(x) = 100 + 800e^{-0.2x}$.
 - (a) Find how many items are sold daily right after advertising concludes.
 - (b) How many days after conclusion do daily sales fall at the 300 level?

3. Evaluate the following integrals:

(a)

$$\int \frac{1}{x}(1 - xe^{7x})dx =$$

(b)

$$\int \frac{(x+2)(x-4)}{x^2}dx =$$

4. The success of the Miracle Computer has raised the price of the Miracle[®] company stock significantly. The rate of increase of the stock has been approximately $1.6e^{0.5t}$ dollars per year, where t is the number of years since 2001 ($0 \leq t \leq 6$). Find a formula for the total increase in stock within t years of 2001.

5. Find the x -coordinates of the points A, B, C and D in the following figure, which shows the graph of the function $f(x) = x^3e^{-x}$.

