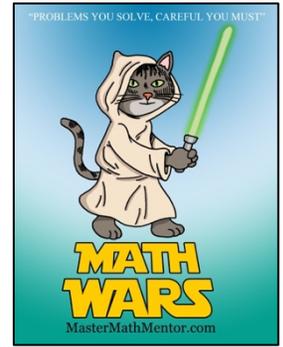# Math Wars – AB Calculus
Topic 119 – Optimization

Maximum Time: 9 Minutes

Directions: To start, you need to download the Math Wars application on your cell phone: Use the QR code or the url:
https://mastermathmentor.com/mmm/mathwars.ashx?key=119

When ready, start the timer and then solve the problems below, entering your choice, A, B, C, D and pressing $\boxed{\text{Submit}}$ for each problem when you are sure of your answer. When complete, stop the timer. You will see problems you got correct in green and incorrect in red. You will receive a score based on how many problems you got right and your time. A perfect score is all problems correct using half the maximum time or less. Text or email your friends with your results.

1. (1 pt) A car rental company charges its customers the same amount for any car. It charges d dollars a day where $60 \le d \le 150$. The number of cars rented per day can be modeled by $n(d) = 850 - 5d$. How much should the company charge each customer to maximize revenue?

   A. $60   B. $85   C. $135   D. $150

2. (3 pts) Suppose that the cost of manufacturing specialized canoes is $C(x) = 4x^3 - 300x + 8000$ where x is the number of canoes constructed. What is the number of canoes that the company should construct that will minimize their average cost?

   A. 5   B. 10   C. 15   D. 18

3. (5 pts) A doctor take the pulse of patient 3 times during an office visit. The reading can vary as the patient might be initially nervous. To approximate the patient's pulse for the visit, Doctor Goldman simply averages the 3 pulses while Dr. Corson examines the expression $0.5(x-a)^2 + (x-b)^2 + (x-c)^2$ where a is the first reading while b and c are the second and third. His approximation is the value of x that minimizes this expression. If $a = 120$, $b = 80$ and $c = 70$, what is the difference between Dr. Goldman's and Dr. Corson's approximation for the pulse?

   A. 0   B. 6   C. 10   D. 12

4. (7 pts) A manufacturer can produce 2 gigabyte flash drives at a cost of $2 apiece. The drives sell for $5 apiece on a particular website, and at this price, consumers on this site have been buying 4,000 drives a month. The manufacturer is planning to raise the price of the drives and estimates that for each $1 increase in the price, 400 fewer drives will be sold each month. If they maximize their revenue, what is their profit?

   A. $6,000   B. $7,500   C. $9,000   D. 15,000

5. (9 pts) A right triangle is inscribed under the curve $y = 9 - x^2$ as shown by the figure to the right. What is the largest area triangle that is possible?

   A. 4   B. 16
   C. 24   D. 32