# DIGITLE – AB CALCULUS
# Puzzle 116 – Optimization


**Directions**: The first 5 problems have single digit answers. The 6th problem has a 5-digit answer (counting leading zeros if present). You have a choice: solve the easier single-digit answer problems or tackle the more difficult 5-digit answer. Once you have done that, attempt to solve the puzzle by entering the following url on your computer, tablet, or phone: https://mastermathmentor.com/mmm/digitle.ashx.
The correct puzzle answer will be the digits of your answer(s) scrambled. Use the following interpretation. You get 6 tries.

Green : the digit is in the answer and is in the correct spot.
Yellow: the digit is in the answer but is not in the correct spot.
Grey : the digit is not in the answer.

**Single Digit Answers:**

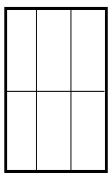
1) An automatic sprinkler system can be programmed to water selected flower beds over a given time period. The more beds there are, the less amount of water that each beds receive. For the number of beds *b*, the amount of watering time each bed gets is $12-\frac{b^2}{16}$, measured in minutes, over a 15-minute time period. To the nearest bed, how many flower beds will maximize the total amount of water that falls on all of the beds?

2) Two chefs compare recipes on soufflés. Chef Bobby Flay estimates that the height above the soufflé dish is given by $h(t)=1.35t^2-0.05t^3$ while chef Gordon Ramsey estimates that the height above the soufflé is given by $h(t)=2.4t^2-0.1t^3$ where *t* is measure in minutes cooked. If both chefs take out their soufflés from the oven at their maximum height, what is the difference in time?

3) The cost in dollars for cleaning up a small town after a blizzard using *p* snowplows is given by $180p^2-16p+8820$. How many snowplows should the town officials use to minimize the average cost per snowplow?

4) Playing the Oaks Golf course, golfers have to go past a little girl's house between the 9th and 10th holes. She sells lemonade on hot days. She charges \$2 and finds that she can sell 100 of them on the weekend. She decides to raise the price. For every 50-cent increase she sells 5 fewer glasses of lemonade. For what price should she charge for a glass of lemonade to increase her weekend revenue?

5) A window maker needs to construct a large window that is 1,512 square inches in area. The window will have 6 separate panels of glass separated by thin strips called mullions as shown in the figure to the right. The cost of the outside framing is \$1.25 per inch while the cost of the mullions is \$0.50 per inch. What is the difference in dimensions (inches) of the least expensive frame meeting the conditions?



**5-Digit Answer:**

6) A right triangle is inscribed under the curve $y=1296-x^2$ as shown by the figure to the right. What is the largest area triangle that is possible?