# AP Calculus – Across and Down

**Clue Set: #12**

## Topic: Optimization

Only digits (0 – 9) and negative signs are allowed. If an answer is an integer, use leading zeros to make the answer fit. (Ex: If 4 digits are required and your answer is 46, enter 0046.)  If an answer has decimal places, the decimal point is dropped and trailing zeros are used to make the answer fit to the required number of decimal places which is specified in the problem. (Ex: If 2 decimal places are required and your answer is 12.4682, round to 12.47 and enter 1247.  If one decimal place is required and your answer is 15, write 15.0 and enter 150. If one decimal place is required and your answer is 0.5, wrote 05.)

## Across

A21.  **(Sci. Calc.)** An amusement park has an incentive program to increase attendance. The incentive is represented by the variable $x$ that is normally set at 0.  On those days, the park averages 1,500 adults paying $25 and 3,500 kids paying $16. For every unit increase in $x$, the adult price drops by $2 and 400 more adults enter the park. For every unit increase in $x$ the child price drops by $3 and 500 more kids enter the park.  The operating cost of the park is $23,350 daily no matter how many people enter the park. What is the maximum profit of the park (to the nearest dollar) ?

A42.  On January 15, 2009, Captain Chesley Sullenberger (Sully) miraculously landed US Airways flight 1549 on the Hudson river after striking a flock of geese. The story quickly went viral. It is estimated that the rate that people learned of the story through their TV's, Internet, and cellphones was $r(t) = \dfrac{102400t}{1024 + t^2}$, where $t$, measured in minutes, was the amount of time from when the story first broke, and $r(t)$ is measured in thousands of people per minute.  At what value of $t$ was this rate a maximum?

## Down

D61.  **(Sci. Calc.)** A cylindrical natural gas container must contain a volume of 7,170 ft$^3$. What should its radius be so that the metal used to make the container (top, bottom and sides) is a minimum (2 decimal places).