AP Calculus – Across and Down

Clue Set: #8

Topic: Derivatives –Continuity & Differentiability, Related Rates

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

A6. If $y=\begin{cases} x^2+ax+b,\ x\ge 2 \\ -ax^2+504x-b,\ x<2 \end{cases}$, for what value of a is the function differentiable? Enter 000 if there is no such value.

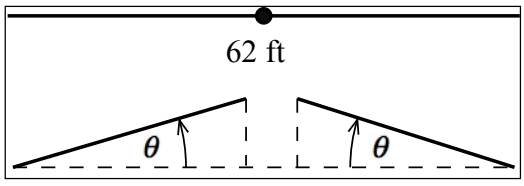
A15. **(Sci. Calc.)** A particle is moving along the curve $y=9-x^2$. How fast is its distance from the point (0, 9) changing at $x = 2.3$ if its x-coordinate is changing at the rate of 1.8 units/sec? (3 decimal place accuracy)

A57. **(Sci. Calc.)** A reservoir in the shape of an inverted cone has top diameter 200 feet and height 50 feet. Due to a drought, water is evaporating from the reservoir. When the height of the water is 42 feet high, the height of the water is lowering at the rate of 2.03 feet/week. How fast (to the nearest 10 feet) is the volume of the water decreasing at that moment, measured in ft^3/week?

A62. **(Sci. Calc.)** Train *S,* 50 miles north of a train station is traveling towards the station at 80 mph. Train *W*, is 20 miles west of the station and is traveling west at 30.15 mph from the station. How fast is the distance between the two trains changing at that instance? (2 decimal place accuracy)

Down

D6. **(Sci. Calc.)** A 62 ft. drawbridge opens in the center as shown by the figure to the right. The bridge opens at the rate of $\frac{2°}{\text{sec}}$. When $\theta = 19°$, find how fast the center of the bridge is rising. (2 decimal places).



D22. Let $f(x)=\begin{cases} e^{ax}+b, x\ge 0 \\ a(x+b)-17, x<0 \end{cases}$ with $b > a$, and a and b are whole numbers. If f is differentiable at $x = 0$, what is the smallest possible value of $a + b$?