

AP Calculus – Across and Down

Clue Set: #18

Topic: Motion w/Integrals

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

A25. **(Sci. Calc.)** A roller coaster called the Lost Mine gains speed very quickly. It moves towards a section of the track that is destroyed. When it reaches that point, it then rolls backwards. Its velocities over the first 60 seconds of the ride are given in the following table. Using a trapezoidal approximation, find the average speed of the roller coaster in feet/sec over the first minute (2 decimal places).

time (sec)	0	5	10	15	20	25	30	35	40	45	50	55	60
velocity (ft/sec)	0	38.3	53.9	67.6	77.0	92.5	72.3	47.8	33.9	4.3	-24.2	-42.3	-54.9

A30. A particle has acceleration function $a(t) = \frac{1}{t+1}$. If the particle is at rest at $t = e - 1$, what was the particle's initial velocity?

A51. **(Gr. Calc.)** Lance throws a Frisbee to the right into a heavy wind with velocity $v(t) = 50e^{-t/2} - 2.3$ and Jeff catches it 10 seconds later. The Frisbee stops in mid-air but, because of the wind, keeps moving. How far (to the nearest foot) does the Frisbee travel from the time it stops until it is caught? (positive to the right, negative to the left).

Down

D2. **(Gr. Calc.)** A particle traveling along the x -axis has velocity $v(t) = 6.012 \sin t^2$, t measured in seconds. A time $t = 0$, it is at $x = 1.5$. Find the distance it travels over the first 2 seconds. (3 decimal place accuracy)