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| Task 1 | In the given graph which represents the movement of a car, answer the following:   1. Between which point and point the car accelerate, and between which points it decelerate? 2. What is the distance traveled at point C? and what is it at point F? 3. Indicate line segments with 0 acceleration, does that mean the car is not moving? Explain. 4. What are the values of acceleration and deceleration of the car at each segment? |
| Task 2 | An environmental engineer has obtained a bacteria culture from a municipal water sample and allowed the bacteria to grow. The initial count of Bacteria is A, and their growth formula with time being in hours is given by:  A: is the summation of your birthday digits divided by **0.5**  C**:** is the summation of your IUS ID number divided by **50.**   1. What is ? And how much is it? 2. After how many hours, the amount of Bacteria would be 100000? 3. Pick up 4 to 5 points in time and draw the graph of Bacteria growth. (This is done by pen and pencil) 4. Use Octave to plot the graph of bacteria growth |

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| Task 3 | 1. Why do we use (need) logarithmic scale? 2. What are the properties of a linear model? 3. Give an example from engineering (life) on a decaying function, write an example of a numerical one. 4. When a fluid flows around an object, it creates a force, called the drag force, that pulls on the object. The coefficient of drag (Cd) is a dimensionless number that describes the relationship between the force created and the fluid and object properties, given as   where is the drag force, is the fluid density, and v is the velocity of the object relative to the fluid. The area of the object the force acts upon is , and for spheres is given by the area of a circle. The Reynolds number in this situation is written as  where is the diameter of the object the force acts upon. the dynamic viscosity of the fluid. The chart below shows this relationship between drag force and Reynolds number.   1. If the Reynolds number is 500, what is the coefficient of drag? 2. If the coefficient of drag is 2, what is the Reynolds number? 3. Ethylene glycol has a dynamic viscosity of 9.13 centipoise and a density of . If the fluid flows around a sphere of diameter 1 centimeter travelling at a velocity of 2.45 centimeters per second, determine the drag force on the particle in units of newton. 4. If a coefficient of drag of 10 is produced, what is the diameter of the particle? Assume the fluid is moving at 1 centimeter per second. |

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| Task 4 | 1. Consider the following loop [r,c]=size(D); j=c;   i=1;  while j > 0  T(i,1)=D(i,i); T(i,2)=D(i,j);  i=i+1; j=j-1; end If we ran the code and generated the following value for T, T = [2 11; 7 16]  what is D?   1. What is the output of M4 if M = [1 3 2; 6 0 2]   [rows,cols]=size(M);  for r=1:1:2\*rows  for c=1:1:2\*cols  M4(r,c)=c; end end |
| Task 5 | Write a program that will ask the user to input his age in year and it will calculate to him his age in days. |
| Task 6 | Write a program that takes a vector as it’s input and returns the maximum, minimum, and mean of the given vector. And it returns how many positive, negative and 0 numbers in the vector as well. |
| Task 7 | Show how to inscribe a square inside a circle such that all the square’s vertices touch the circles’ circumference. Then, calculate the area of the square if the circle’s area is 628 cm2 |
| Task 8 | An ant is crawling on a unit cube, what is the shortest distance for it to get from start to end. |
| Task 9 | Generally, when a car door is opened, the interior lights come on and turn off again when the door is closed. Some cars turn the interior lights on and off gradually. Suppose that you have a car with 25 watts of interior lights. When a door is opened, the power to the lights increases linearly from 0 to 25 watts over 2 seconds. When the door is closed, the power is reduced to zero in a linear fashion over 5 seconds. **(a)** Create a proper plot of power (*P*, on the ordinate) and time (*t*). **(b)** Using the graph, determine the total energy delivered to the interior lights if the door to the car is opened and then closed 10 seconds later |

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| Task 10 | Below is a graph of the vertical position of a person bungee jumping, in meters. **(a)** What is the closest this person gets to the ground? **(b)** When this person stops bouncing, how high off the ground will the person be? **(c)** If the person has a mass of 70 kilograms, how would the graph change for a jumper of 50 kilograms? Approximately sketch the results on the graph. **(d)** If the person has a mass of 70 kilograms, how would the graph change for a jumper of 80 kilograms? Approximately sketch the results on the graph.  **(e)**  **Use Octave to generate a close graph to the shown** |

**ENS101 HW 2, Preparation for midterm make up and part of the final, deadline Friday 23.12.2022**