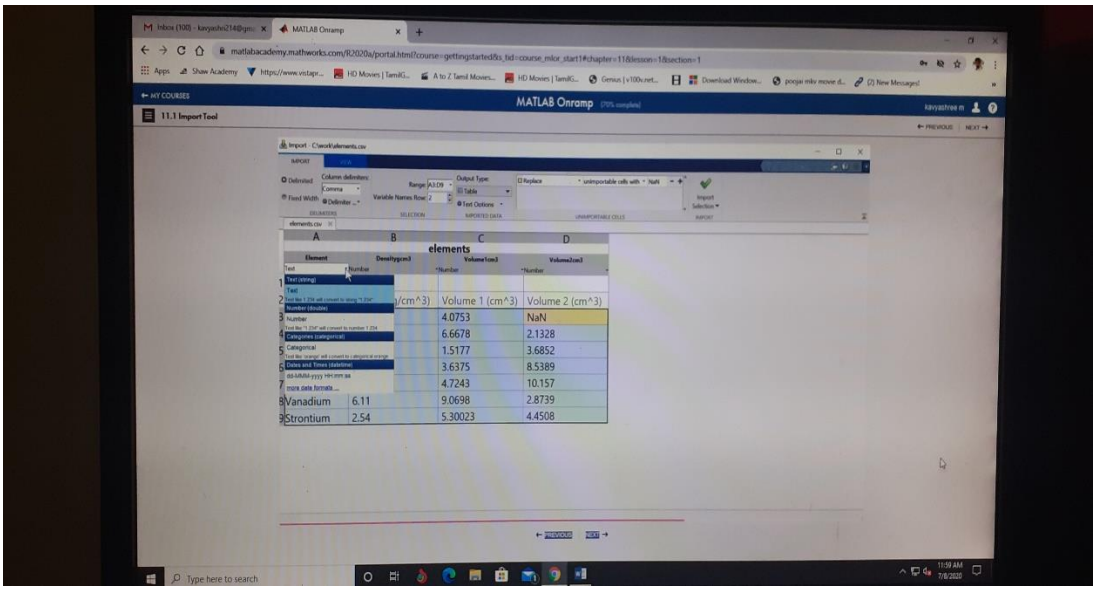
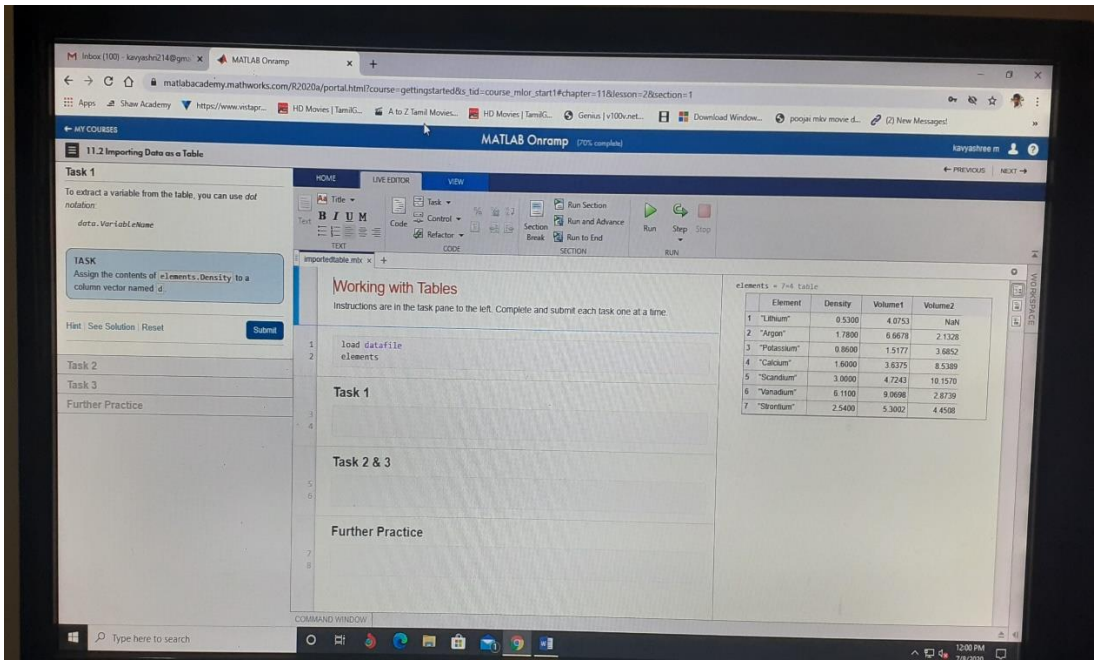
DAILY ASSESSMENT

Date:	**8-7-2020**	**Name:**	**Kavyashree m**
Course:	**Matlab**	**USN:**	**4al15ec036**
Topic:	**Logical arrays, programming, final project, conclusion.**	**Semester & Section:**	**8th A**
Github Repository:	**kavya**		

FORENOON SESSION DETAILS





Logical arrays

Addition and Subtraction

The interesting part is of course applying some operations on those arrays. You can for example use the classic arithmetic operations + and - on any array in matlab: this results in the vector addition and subtraction as defined in classic vector vectors spaces , which is simply the addition and subtraction elements wise:

```
>> [1, 2, 3] - [1, 2, 1]

ans =

  0   0   2
```

Multiplication by a Scalar

The multiplication by a scalar also works as expected:

```
>> 2 * [1, 2, 3]

ans =

  [2, 4, 6]
```

Multiplying and Dividing Arrays

Multiplication and division are more problematic: multiplying two vectors in does not make sense. It makes sense only in the matrix context. Using the symbol * in matlab computes the matrix product, which is only defined when the number of columns of the left operand matches the number of rows of the right operand:

```
>> a = [1, 2; 3, 4];
>> a * a
```

```
ans =
   7    10
  15    22
>> a = [1, 2, 3]; b = [1; 2; 3];
>> a * a
??? Error using ==> *
Inner matrix dimensions must agree.
>> a * b

ans =

  14
```

Using the division symbol / has even more constraints, as it imposes the right operand to be invertible.

For square matrices,

For example :

```
>> a = [1, 2; 3, 4]; b = [1, 2; 1, 2]
>> b / a

ans =

   1     0
   1     0
>> a / b
Warning: Matrix is singular to working precision.
```

```
ans =

  Inf   Inf
  Inf   Inf
```

Component-wise Operations

If you desire to multiply or divide two matrices or vectors component-wise, or to raise all components of one matrix to the same power, rather than using matrix definitions of these operators, you can use the dot (.) operator. The two matrices must have the same dimensions. For example, for multiplication,

```
>> a = [1, 2, 3];
>> b = [0, 1, 2];
>> a .* b

ans =

  0    2    6
```

The other two componentwise operators are ./ and .^.

As matlab is a numerical computing language, you should keep in mind that a matrix which is theoretically invertible may lead to precision problems and thus giving imprecise results or even totally wrong results. The message above "matrix is singular to working precision" should appear in those cases, meaning the results cannot be trusted.

Non-square matrices can also be used as the right operand of /; in this case, it computes the pseudoinverse. This is especially useful in least square problems.

Transpose

A transpose of a matrix is taken using .'

```
>> array = [1,2;3,4]
array =
   1    2
   3    4
>> array.'
ans =
   1    3
   2    4
```

Boolean Operators on Arrays

The same boolean operators that can be used for point values can also be used to compare arrays. To do this, MATLAB compares the elements componentwise and returns them in a logical array of the same size as the two arrays being compared. The two arrays must have the same size. For example,

```
>> A = [2,4], B = [1,5];
>> A < B

ans =
   [0    1]
```

You must be careful when using comparisons between arrays as loop conditions, since they clearly do not return single values and therefore can cause ambiguous results. The loop condition should be reducable to a single boolean value, T or F, not an array. Two common ways of doing this are the "any" and the "all" functions. A function call

any(array) will return true if array contains any nonzero values and false if all values are zero. It does the comparisons in one direction first then the other, so to reduce a matrix you must call the any function twice. The function all, similarly, returns true if and only if all elements in a given row or column are nonzero.

Concatenating Arrays

Concatenating arrays involves sticking arrays together.

Horizontal Concatenating

Horizontal concatenation is done by treating an array as if it were a variable included in a row.

```
>> a = [1,2;3,4];
>> b = [5,6;7,8];
>> c = [a,b]
c =
   1   2   5   6
   3   4   7   8
```

Vertical Concatenating

Vertical concatenation is done by treating an array as if it were a variable included in a column.

```
>> a = [1,2;3,4];
>> b = [5,6;7,8];
>> c = [a;b]
c =
   1   2
   3   4
   5   6
```

```
   7     8
```

Solving Linear Systems

To solve a linear system in the form **A**x = b use the "\" operator.

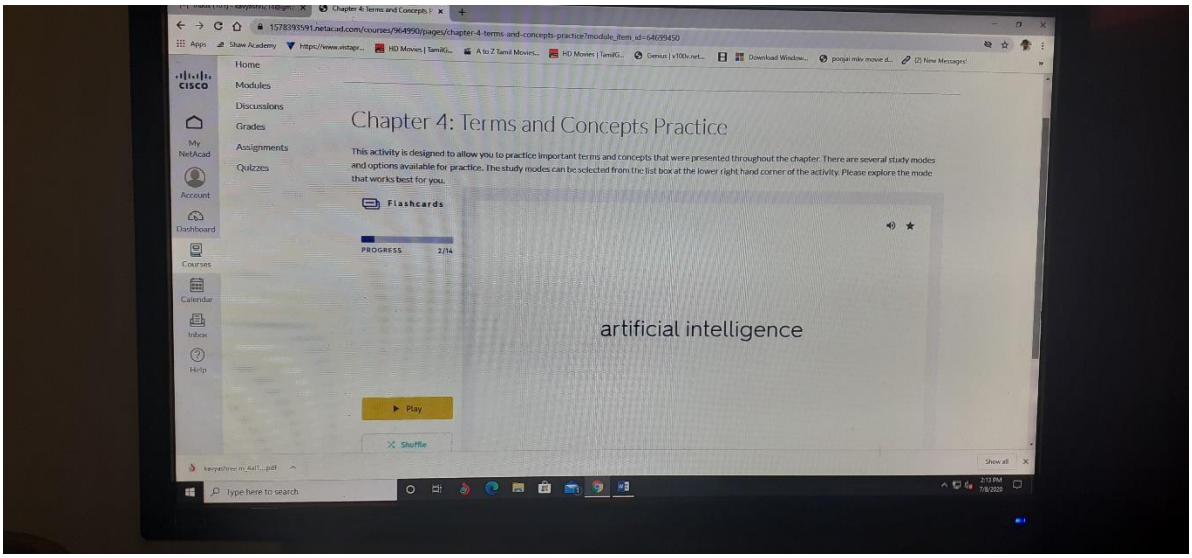
Example:

```
>>A = [4 5 ; 2 8];
b = [23 28]';
x = A\b

x =

    2
    3
```

AFTERNOON SESSION DETAILS

Date:	**8-7-2020**	**Name:**	**Kavyashree m**
Course:	**Cisco certification on IOT**	**USN:**	**4al15ec036**
Topic:	**Chapter 4**	**Semester & Section:**	**8th A**
Github Repository:	**kavya**		

Image of session



Automation

The Internet of Things (IoT) is about to transform the next decade. Literally everything will be connected to everything. Some estimate that 50 billion devices will be IoT-connected by 2020. The clock on the connected device transition is ticking very loudly. We discussed the broad concepts of IoT previously (Automation World, April 2011). Here we will focus on the emergence of IoT in the world of automation.

The primary drive for automation IoT is to significantly reduce operating expenditures when automation devices, sensors and actuators become Internet-enabled devices. It's the next huge leap in productivity because there are major advantages to be derived from the acquisition and organization of previously unthinkable amounts of data. New Enterprise Manufacturing Intelligence software (EMI) brings manufacturing-related data together from many sources for reporting, analysis, visual summaries and passing data between enterprise-level and plant-floor systems.

With the increasing use of fieldbus within control networks and the spread of software intelligence, some think that IoT is already emerging in industry. But, the progress that's occurred is just a small fraction of what can and will happen over the next decade. The inflection point will occur when literally everything is connected with inexpensive and easy-to-install wireless networks.

Industrial IoT must be self-organizing, self-configuring, self-healing, scalable to large sizes, with very low energy consumption, low cost, simple to install and based on global standards. That's a tall order, which current automation network standards simply cannot meet. In my opinion, with the spread of IoT, the ZigBee over IEEE 802.15.4 standard, currently languishing with minimal market share, will emerge to mainstream prominence.

Artificial intelligence and machine learning

Artificial intelligence

AI is anticipated to perform a plethora of smart tasks such as voice recognition, language translation, decision-making, etc. without human intrusion. Alternatively, Internet of Things (IoT) includes a chain of interconnected devices that transfer data over a network. IoT devices have made an entry into our daily lives and seek to bring in an advanced level of comfort. These devices bank on internet connectivity and generate unconceivable amounts of data which is pertinent to user behaviors, their preferences, personal

information, etc. and therefore cannot be ignored. However, a lot of enterprises are absolutely clueless as of how to store and process such outsized amounts of data. This is encumbering the growth and potential of IoT.

Artificial intelligence, in this case, can greatly help to accrue the deluge of data that is processed by the IoT devices. It allows to analyze the data and make sense out of it. Thus, AI is predicted to be the chief propellant to initiate the unprecedented growth of the IoT revolution. Considering the potential and sum of benefits on a proposal, it comes as no surprise that a large number of business enterprises are embracing the new opportunities offered by the merger of AI and IoT.

1) Manufacturing

All types of manufacturing industries such as aircrafts, automobiles, household appliances, food and beverage, mining, etc. are integrating smart sensors into their machinery in order to perform prognostic analysis and augment their efficiencies. They are looking to set up an autonomous industrial unit which is soon going to be the future rage. Such a setup with smart sensors will help the industries in detecting the vital threat areas and thus diminishing machinery collapses and be lowering down costs.

2) Smart Homes

IoT has led to the emergence of smart home concept where all appliances are connected to each other through a common network. By combining this with AI, all these appliances will be able to interpret their owner's instructions and take intelligent decisions accordingly.

A smart home technology aims to make our lives easier and comfortable by presenting a chance to control the devices remotely, regardless of the location. For example, you can pre-decide the time when your coffee shall be brewed, your TV program shall be switched on, etc. Additionally, in case of a fire, it can be encoded to unlock all doors and make a call to the fire department. Besides, it can also help to bring down the electricity

costs by turning off the appliances when not in use, or switching off the lights when no one is home.

3) Body sensors

Smart sensors are hugely instrumental in detecting different bodily activities to maintain proper health. A lot of medical companies are investing in medical sensors that can help the patients in tracking their activities in order to improve their health, for example, these sensors can help to monitor blood sugar levels and release insulin in case of an emergency.

These sensors are also being used by construction companies to note the load carrying capacity as well as a posture of their laborers to avoid any kind of injuries and augment productivity.

4) Smart buildings

Buildings can be fitted with smart sensors that can make predictive analysis and increase its security by preventing accidents and risks such as fire, short-circuit, flooding, etc. They also monitor the movement of people and bring down costs by adjusting temperatures and improving energy efficiency.

5) Airlines

Sensors are fitted on aircrafts that faultlessly monitor the prominence of various risks and errors. They predict future faults along with their degree of severity to reduce aircraft downtime and augment the safety of passengers. Airline companies can also use these sensors to identify maintenance issues that may cause flight delays and cancellations.

6) Oils Rigs

Oil industries have to invest fortunes of money in procuring oil drilling machinery. These machineries when getting spoilt causes a huge loss to the companies. Thanks to IoT and AI, oil companies can benefit from smart sensors that can be easily attached to the oil machinery to make preventative maintenance analysis and thus, significantly bring down operational costs.

Machine learning

Machine Learning (ML) and the Internet of Things (IoT) are huge buzzwords right now, and they're both near the peak of the hype cycle. The above quote came somewhat jokingly from an investor, but it has some truth to it too.

The data models that are typical of traditional data analytics are often static and of limited use in addressing fast-changing and unstructured data. When it comes to IoT, it's often necessary to identify correlations between dozens of sensor inputs and external factors that are rapidly producing millions of data points.

While traditional data analysis would need a model built on past data and expert opinion to establish a relationship between the variables, machine learning starts with the outcome variables (e.g. saving energy) and then automatically looks for predictor variables and their interactions

Intent-based networking (IBN)

Intent-based networking (IBN) is an emerging technology concept that aims to apply a deeper level of intelligence and intended state insights to networking. Ideally, these insights replace the manual processes of configuring networks and reacting to network issues. Simply put, administrators can send a request to tell the network what outcome they want (their intent) instead of needing to code and execute individual tasks manually.

How does intent-based networking work?

Intent-based networking relies on artificial intelligence and machine learning to prescribe and perform routine tasks, set policies, respond to system events, and verify that goals and actions have been achieved. For example, it can make servers reachable from specific networks, if that is what's required to achieve a given intent. The system not only configures network changes but also verifies that they are being performed, and it can

make adjustments as necessary. Considered an evolution of software-defined networking (SDN), intent-based networking builds upon that technology to enable a higher level of intelligence that can define what tasks are to be automated.

What is the purpose of intent-based networking?

Intent-based networking companies range from start-ups to established networking vendors and all offer slightly different options. But the goal is networking that uses machine learning and cognitive computing to enable more automation and less time spent on manual configuration and management. They provide software that can translate intent to network configuration. With intent-based networking, network administrators define an outcome or business objective—the intent—and the network's software figures out how to achieve that goal, thanks to artificial intelligence and machine learning. Intent-based networking systems not only automate time-consuming tasks and provide real-time visibility into a network's activity to validate a given intent, they also predict potential deviations to that intent, and prescribe the action required to ensure that intent. This greater intelligence makes the network faster and more agile and reduces errors. This ability to self monitor and self correct is a core component of intent-based networking.

The advantages of intent-based networking

Intent-based networking has some clear advantages over regular networking and even over software-defined networking. Most of these advantages translate to a significant time savings:

- Reduction in manual tasks: An intent-based network translates commands into actions. A network administrator does not have to configure a network to comply with a new policy or business need. The network does the thinking, verifying that a configuration will work, suggesting options to the administrator, and then

making the changes to adapt to the desired configuration. The intent-based network can also provision and repair itself without human intervention.

- Faster troubleshooting and resolution: Because an intent-based network is continuously monitoring itself, performance issues are identified immediately. The intent-based network also resolves these issues, using machine learning to determine the best solution and implement it.
- Reduced risk of being out of compliance: Another advantage to a network that is constantly monitoring itself and correcting issues is that the network stays in compliance with any policies set by the network administrator.
- Better security: Part of the monitoring that the intent-based network is constantly doing is looking for threats, even in encrypted traffic. Security breaches are immediately identified and contained.
- Optimized analytics: When network administrators understand how a network is performing, they can make better decisions that result in better business outcomes. An intent-based network is constantly gathering data about itself that can be analyzed in any number of ways, providing valuable information about network performance, security threats, and more.
- Rapid implementation of business goals into network configurations: The key differentiator between an intent-based network and a software-defined network is that an intent-based network immediately translates high-level business goals into optimal network configurations to support those goals. A network administrator can quickly review and choose from vetted configuration options, which saves a tremendous amount of time spent planning, testing, and manually configuring. Meeting business goals faster translates into significant ROI.