Assignment-10

The due date for submitting this assignment has passed.

Due on 2021-03-31, 23:59 IST.

As per our records you have not submitted this assignment.

1) Consider the matrix $\mathbf{H}$ given as *1 point*

$$\mathbf{H} = \begin{bmatrix} 0 & -1 \\ 0 & 0 \end{bmatrix}$$

The matrix exponential $e^{t\mathbf{H}}$ is given as

- $\begin{bmatrix} 1 & -t \\ 0 & 1 \end{bmatrix}$
- $\begin{bmatrix} 0 & e^{-t} \\ 0 & 0 \end{bmatrix}$
- $e^{-t}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
- $e^{-t}\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\begin{bmatrix} 1 & -t \\ 0 & 1 \end{bmatrix}$

2) Consider the matrix $\mathbf{H}$ given as *1 point*

$$\mathbf{H} = \omega\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$

The matrix exponential $e^{t\mathbf{H}}$ is given as

- $\begin{bmatrix} \cos(\omega t) & \sin(\omega t) \\ \sin(\omega t) & \cos(\omega t) \end{bmatrix}$
- $\begin{bmatrix} \cos(\omega t) & \sin(\omega t) \\ -\sin(\omega t) & \cos(\omega t) \end{bmatrix}$
- $e^{\omega t}\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$
- $e^{t}\begin{bmatrix} 0 & \omega \\ -\omega & 0 \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\begin{bmatrix} \cos(\omega t) & \sin(\omega t) \\ -\sin(\omega t) & \cos(\omega t) \end{bmatrix}$

3) In 4G cellular systems, *1 point*

- SC-FDMA is used in the DL and OFDM in the UL
- SC-FDMA is used in the UL and OFDM in the DL
- OFDM is used both in UL and DL
- SC-FDMA is used both in the UL and DL

No, the answer is incorrect.
Score: 0

Accepted Answers:
SC-FDMA is used in the UL and OFDM in the DL

4) The PAPR (Peak-to-Average Power Ratio) of SC-FDMA, in comparison to OFDM, is *1 point*

- Identical
- Cannot be determined
- Higher
- Lower

No, the answer is incorrect.
Score: 0

Accepted Answers:
Lower

5) At the receiver in an SC-FDMA system, the order of operations is *1 point*

- IFFT, followed by Equalization, followed by FFT
- Equalization, followed by FFT, followed by IFFT
- IFFT, followed by FFT, followed by Equalization
- FFT, followed by Equalization, followed by IFFT

No, the answer is incorrect.
Score: 0

Accepted Answers:
FFT, followed by Equalization, followed by IFFT

6) The general model for an autonomous Linear Dynamical System is *1 point*

- $\frac{d}{dt}\bar{\mathbf{v}}(t) = 0$
- $\frac{d}{dt}\bar{\mathbf{v}}(t) = \mathbf{H}\bar{\mathbf{v}}(t)$
- $\mathbf{H}\bar{\mathbf{v}}(t) = 0$
- $\frac{d}{dt}\bar{\mathbf{v}}(t) = \mathbf{H}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{d}{dt}\bar{\mathbf{v}}(t) = \mathbf{H}\bar{\mathbf{v}}(t)$

7) The solution of the autonomous Linear Dynamical System described in lectures is *1 point*

- $\bar{\mathbf{v}}(t) = e^{t}\mathbf{H}$
- $\bar{\mathbf{v}}(t) = e^{\mathbf{H}}\bar{\mathbf{v}}(0)t$
- $\bar{\mathbf{v}}(t) = e^{t\mathbf{H}}\bar{\mathbf{v}}(0)$
- $\bar{\mathbf{v}}(t) = \mathbf{H}\bar{\mathbf{v}}(0)t$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\bar{\mathbf{v}}(t) = e^{t\mathbf{H}}\bar{\mathbf{v}}(0)$

8) Consider an autonomous LDS with *1 point*

$$\frac{d}{dt}\bar{\mathbf{v}}(t) = \mathbf{H}_i\bar{\mathbf{v}}(t), (i-1)T \leq t < iT$$

for $i = 1, 2, \cdots, N$. The solution $\bar{\mathbf{v}}(NT)$

- $e^{-T\mathbf{H}_N} e^{-T\mathbf{H}_{N-1}} \cdots e^{-T\mathbf{H}_1}\bar{\mathbf{v}}(0)$
- $T^N\mathbf{H}_N\mathbf{H}_{N-1}\cdots\mathbf{H}_1\bar{\mathbf{v}}(0)$
- $e^{T\mathbf{H}_N} e^{T\mathbf{H}_{N-1}} \cdots e^{T\mathbf{H}_1}\bar{\mathbf{v}}(0)$
- $(e^{T\mathbf{H}_N} + e^{T\mathbf{H}_{N-1}} + \cdots + e^{T\mathbf{H}_1})\bar{\mathbf{v}}(0)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$e^{T\mathbf{H}_N} e^{T\mathbf{H}_{N-1}} \cdots e^{T\mathbf{H}_1}\bar{\mathbf{v}}(0)$

9) Support Vector Machines (SVMs) can be used for *1 point*

- Classification
- Regression
- Beamforming
- Optimal power allocation

No, the answer is incorrect.
Score: 0

Accepted Answers:
Classification

10) The SVM problem corresponding to points $\bar{\mathbf{x}}(k)$, binary outputs $y(k) \in \pm 1, k = 1, 2, \cdots, m$ is *1 point*

- $\max \|\bar{\mathbf{a}}\|$
  subject to $y(k)(\bar{\mathbf{a}}^T\bar{\mathbf{x}}(k) + b) \geq 1$
- $\max \|\bar{\mathbf{a}}\|$
  subject to $y(k)(\bar{\mathbf{a}}^T\bar{\mathbf{x}}(k) + b) \geq 0$
- $\min \|\bar{\mathbf{a}}\|$
  subject to $y(k)(\bar{\mathbf{a}}^T\bar{\mathbf{x}}(k) + b) \geq 0$
- $\min \|\bar{\mathbf{a}}\|$
  subject to $y(k)(\bar{\mathbf{a}}^T\bar{\mathbf{x}}(k) + b) \geq 1$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\min \|\bar{\mathbf{a}}\|$
subject to $y(k)(\bar{\mathbf{a}}^T\bar{\mathbf{x}}(k) + b) \geq 1$