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Courses » LDPC and Polar Codes in 5G Standard

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Unit 14 - Week 3 Assignments



Register for **Certification exam**

Assignment 3



1 point



How to access the portal

Matlab access and Learning Modules

Week 0: Introduction to **Error Correction** Codes

Week 0 : Linear **Binary Block** Codes

Week 0: **Assignment**

Join the 5G Revolution in India

Week 1: LDPC Codes for 5G

Week 1: 5G Standard

Week 1: **Assignments**

Week 2: Building

The due date for submitting this assignment has passed. As per our records you have not submitted this Due on 2019-02-27, 23:59 IST.

1) Let $x=[1 \ 1 \ 0 \ 1]$ be the polar transform of a vector $u=[u_1 \ u_2 \ u_3 \ u_4]$. **1 point** Then u =



assignment.

 $[1 \quad 0 \quad 1 \quad 1]$

 $[0 \quad 1 \quad 0 \quad 1]$



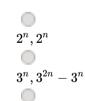
No, the answer is incorrect. Score: 0

Accepted Answers:

$$\begin{bmatrix} 1 & 0 & 1 & 1 \end{bmatrix}$$

²⁾ Let $G_2=\begin{bmatrix}1&0\\1&1\end{bmatrix}, G_{2^n}=G_2^{\,\,\otimes n}$ where \otimes is the Kronecker product or the tensor

product. The number of ones and the number of zeros in G_{2^n} are respectively,



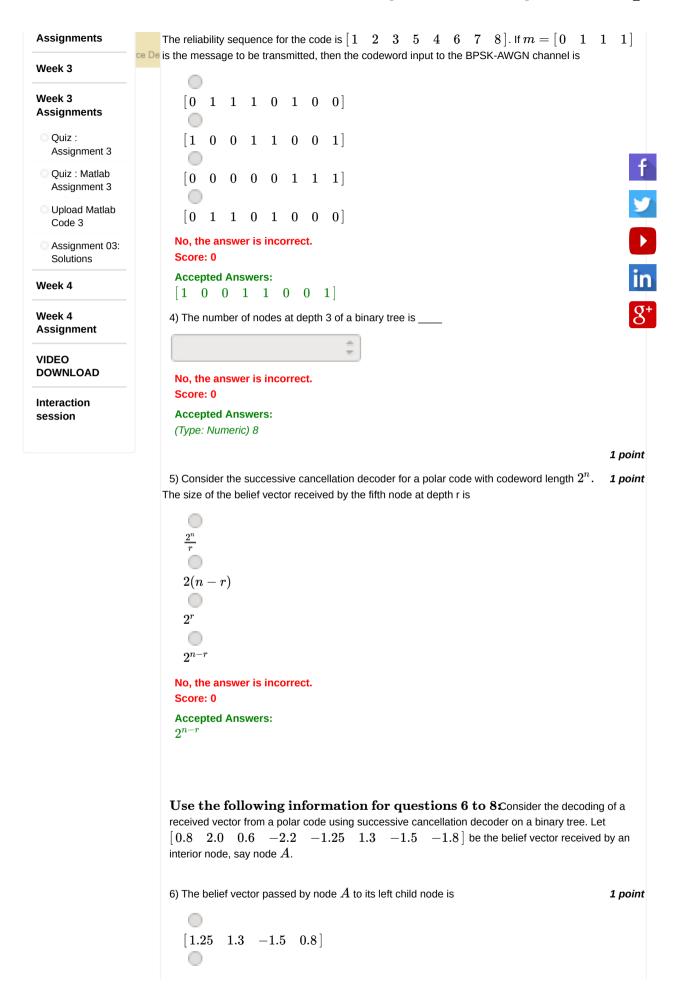
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A project of



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$$\begin{bmatrix} -0.8 & 1.3 & -0.6 & 1.8 \end{bmatrix}$$

$$\begin{bmatrix} -1.25 & 1.3 & 1.5 & -0.8 \end{bmatrix}$$

$$\begin{bmatrix} 0.8 & 1.3 & 0.6 & -1.8 \end{bmatrix}$$

No, the answer is incorrect.

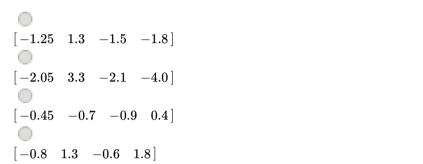
Score: 0

Accepted Answers:

 $\begin{bmatrix} -0.8 & 1.3 & -0.6 & 1.8 \end{bmatrix}$



7) Let $u=[0 \ 1 \ 0 \ 1]$ be the hard-decision vector returned to node A by its left child 1 points node. Then the belief vector passed by node \boldsymbol{A} to its right child node is



No, the answer is incorrect.

Score: 0

Accepted Answers:

$$[-0.45 \quad -0.7 \quad -0.9 \quad 0.4]$$

8) Let $v = \begin{bmatrix} 1 & 0 & 0 & 1 \end{bmatrix}$ be the hard-decision vector returned to node A by its right child **1** point node. Then the hard-decision vector returned by node A to its parent node is

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $[1 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0 \ 1]$

Use the following information for questions 9 to 12 Consider a coded-BPSK transmission over an AWGN channel using the (16,8) polar code constructed using the reliability sequence as given in 5G Standard(link to reliability\ sequence.txt). The received vector is provided in received_vector.txt. Consider decoding the received vector using the successive cancellation decoder(as explained in the lectures). The nodes at each layer are numbered from left to right starting from 0. A node can be uniquely indexed by specifying the depth and the node number.

9) The frozen bit positions in this code will be:

1 point

```
[1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8]
   [1 \ 2 \ 3 \ 5 \ 9 \ 4 \ 6 \ 10]
  [7 11 13 8 12 14 15 16]
  [9 \ 10 \ 11 \ 12 \ 13 \ 14 \ 15 \ 16]
 No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 [1 \ 2 \ 3 \ 5 \ 9 \ 4 \ 6 \ 10]
10) The belief vector received by node 0 at depth 2 is:
  [0.2920 \quad 0.9709 \quad 0.5830 \quad 0.5973]
   \begin{bmatrix} 0.6170 & 1.0100 & 0.5830 & 0.9309 & 0.2920 & 0.9709 & 1.0729 & 0.5973 \end{bmatrix} 
  \begin{bmatrix} 3.6394 & -5.1449 & -4.0993 & -5.6242 \end{bmatrix}
  \begin{bmatrix} 0.6170 & -1.5227 & -0.6619 & -0.9309 \end{bmatrix}
 No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 [0.2920 \quad 0.9709 \quad 0.5830 \quad 0.5973]
11)The belief vector passed by node 1 at depth 1 to its right child is:
                                                                                              1 point
  [1.2999 \ 2.5328 \ 1.2449 \ 2.0872]
  [0.9090 \quad 1.9810 \quad 1.6559 \quad 1.5283]
  \begin{bmatrix} -1.0397 & -0.0794 & -1.6095 & 1.4499 \end{bmatrix}
   \begin{bmatrix} 3.6394 & -5.1449 & -4.0993 & -5.6242 \end{bmatrix}
 No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 \begin{bmatrix} 3.6394 & -5.1449 & -4.0993 & -5.6242 \end{bmatrix}
                                                                                              1 point
12)The decoded message is:
  [0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0]
  [0 \ 0 \ 1 \ 0 \ 0 \ 0 \ 0]
  [0 \ 0 \ 1 \ 0 \ 0 \ 0 \ 0 \ 1]
   [1 \ 0 \ 0 \ 1 \ 1 \ 0 \ 0 \ 0]
 No, the answer is incorrect.
```

