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NPTEL

reviewer3@nptel.iitm.ac.in ▾

Courses » Information Theory, Coding and Cryptography

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Unit 7 - Week 6

Assignment 6

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-12, 23:59 IST.

1) Two *k x n* matrices generate equivalent linear *(n, k)* codes over *GF(q)* if one matrix can be obtained from the other by ***1 point***

- Permutation of rows
- Addition of a scalar multiple of one row to another
- Permutation of columns
- All of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
All of the above

2) A generator matrix can be reduced to its Systematic Form of the type G = [***I*** | ***P***] where ***1 point***

- ***I*** is a $k \times k$ identity matrix and ***P*** is a $k \times k$ matrix
- ***I*** is a $k \times k$ identity matrix and ***P*** is a $k \times (n-k)$ matrix
- ***I*** is a $n \times k$ identity matrix and ***P*** is a $k \times (n-k)$ matrix
- ***I*** is a $n \times n$ identity matrix and ***P*** is a $n \times (n-k)$ matrix

No, the answer is incorrect.
Score: 0

Accepted Answers:
I is a $k \times k$ identity matrix and P is a $k \times (n-k)$ matrix

3) ***1 point***

Consider a (7, 4) code with $\boldsymbol{G} = \begin{bmatrix} 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$. Choose the option which does not list a valid co

- 0001101
- 0110100
- 1110000
- 1111111

No, the answer is incorrect.
Score: 0

Accepted Answers:
1110000

4) Consider the (23, 12, 7) binary code. If it is used over a binary symmetric channel (BSC) with probability of bit error p = 0.01, the word error will be approximately ***1 point***

- 0.00001

Google

Accepted Answers:
0.00008

5) Consider a linear block code over GF(11) with blocklength n = 10, satisfying the following two constraints: **1 point**

$$\sum_{i=0}^{9} ic_i = 0 \text{ calculated (mod 11) and } \sum_{i=0}^{9} (10-i)c_i = 0 \text{ calculated (mod 11)}$$

The minimum distance of this code is

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0

Accepted Answers:
1

6) Let C be a binary perfect code of block length n with minimum distance 7. A possible value of n can be **1 point**

- 15
- 21
- 23
- 33

No, the answer is incorrect.
Score: 0

Accepted Answers:
23

7) Let r_H denote the code rate for the binary Hamming code. The $\lim_{k\to\infty} r_H$ is given by **1 point**

- 0
- 0.5
- 1.0
- Infinity

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.0

8) The next-generation spacecraft to Mars, Mangalyan X,would be sending color photographs over a binary symmetric satellite channel that has a reliability of 0.999 and is subject to randomly scattered noise. The spacecraft creates photographs using pixels of 128 different colors. Thus each color is a codeword. The space mission would like the probability of a pixel in the received image being assigned an incorrect color to be less than 0.0001. The parameters (n, k, d*) of the most efficient linear code that could be used by the spacecraft would be **1 point**

- (15, 7, 3)
- (11, 7, 3)
- (31,11, 5)
- (15, 11, 5)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(11, 7, 3)

9) The next-generation spacecraft to Mars, Mangalyan X,would be sending color photographs over a binary symmetric satellite channel that has a reliability of 0.999 and is subject to randomly scattered noise. The spacecraft creates photographs using pixels of 128 different colors. Thus each color is a codeword. The space mission would like the probability of a pixel in the received image being assigned an incorrect color to be less than 0.0001. The parameters (n, k, d*) of the most efficient linear code that could be used by the spacecraft would be **1 point**

- (15, 7, 3)
- (11, 7, 3)
- (31,11, 5)
- (15, 11, 5)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(11, 7, 3)

10) The generator matrix, $G_2 = \begin{bmatrix} x_1 & x_2 \\ -x_2 & x_1 \end{bmatrix}$, corresponds to ***0 points***

- real orthogonal design
- generalized real orthogonal design
- complex orthogonal design
- generalized complex orthogonal design

No, the answer is incorrect.
Score: 0

Accepted Answers:
real orthogonal design

11) The code matrix of the Alamouti scheme is given by ***1 point***

- $X = \begin{bmatrix} x_1 & x_2 \\ -x_2^* & x_1^* \end{bmatrix}$
- $X = \begin{bmatrix} x_1 & x_2 \\ -x_2 & x_1 \end{bmatrix}$
- $X = \begin{bmatrix} x_1 & x_2 \\ x_2^* & x_1^* \end{bmatrix}$
- $X = \begin{bmatrix} x_1 & -x_2 \\ -x_2^* & x_1^* \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$X = \begin{bmatrix} x_1 & x_2 \\ -x_2^* & x_1^* \end{bmatrix}$

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