Problem 1

1

1

1

1

1

1

0

0

0

0

0

0

B:7

A:6

F:12

G:20

D:10

E:18

C:16

A: 1110

B: 1111

C: 00

D: 011

E: 010

F: 110

G: 10

1. Encode BAEDC = 1111 1110 010 011 00
2. Decode 001100111110 = CFDA

Problem 2

P(I, j)

j

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | 1 | 6 |
|  |  |  |  |  |  | 1 | 5 |
|  |  |  |  | 13/16 | 15/16 | 1 | 4 |
|  |  |  |  | 11/16 | 7/8 | 1 | 3 |
|  |  |  | 5/16 | 1/2 | 3/4 | 1 | 2 |
|  |  | 1/16 | 1/8 | 1/4 | 1/2 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 |  | 0 |
| 6 | 5 | 4 | 3 | 2 | 1 | 0 |  |

j

i

P(1, 1) = (P(0, 1) + P(1, 0)) / 2 = (1 + 0) / 2 = 1/2

P(2, 1) = (P(1, 1) + P(2, 0)) / 2 = (1/2 + 0) / 2 = 1/4

P(1, 2) = (P(0, 2) + P(1, 1)) / 2 = (1 + 1/2) / 2 = 3/4

P(2, 2) = (P(1, 2) + P(2, 1)) / 2 = (3/4 + 1/4) / 2 = 1/2

P(1, 3) = (P(0, 3) + P(1, 2)) / 2 = (1 + 3/4) / 2 = 7/8

P(3, 1) = (P(2, 1) + P(3, 0)) / 2 = (1/4 + 0) / 2 = 1/8

P(4, 1) = (P(3, 1) + P(4, 0)) / 2 = (1/8 + 0) / 2 = 1/16

P(3, 2) = (P(2, 2) + P(3, 1)) / 2 = (1/2 + 1/8) / 2 = 5/16

P(2, 3) = (P(1, 3) + P(2, 2)) / 2 = (7/8 + 1/2) / 2 = 11/16

P(1, 4) = (P(0, 4) + P(1, 3)) / 2 = (1 + 7/8) / 2 = 15/16

P(2, 4) = (P(1, 4) + P(2, 3)) / 2 = (15/16 + 11/16) / 2 = 13/16

Problem 3

Tree Edge

Tree Edge

5/10

3/4

2/11

Tree Edge

Tree Edge

Cross Edge

Back Edge

0/13

6/7

8/9

1/12

Tree Edge

Back Edge

Forward Edge

Forward Edge

Forward Edge

Sequence: G 🡺 E 🡺 B 🡺 A 🡺 C 🡺 D 🡺 F

Problem 4

Part 1: -

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **s** | **a** | **b** | **c** | **d** | **e** |
| Initial iteration |  | 0 |  |  |  |  |  |
| 1st iteration | **s** | - | 16 | 5 | 12 |  |  |
| 2nd iteration | **b** | - | 8 | - | 10 | 9 |  |
| 3rd iteration | **a** | - | - | - | 10 | 9 |  |
| 4th iteration | **d** | - | - | - | 10 | - |  |
| 5th iteration | **c** | - | - | - | - | - | 12 |

Part 2: -

Shortest path:

s to a: s 🡺 b 🡺 a

s to b: s 🡺 b

s to c: s 🡺 b 🡺 c

s to d: s 🡺 b 🡺 d

s to e: s 🡺 b 🡺 c 🡺 e

Problem 5

Part 1: -

Initial graph: -

15

10

20

4

8

7

9

5

12

19

17

6

Step 1: -

15

10

20

4

8

7

9

5

12

19

17

6

Step 2: -

15

10

20

4

8

7

9

5

12

19

17

6

Step 3: -

15

10

20

4

8

7

9

5

12

19

17

6

Step 4: -

15

10

20

4

8

7

9

5

12

19

17

6

Step 5: -

15

10

20

4

8

7

9

5

12

19

17

6

Step 6: -

15

10

20

8

7

9

5

12

19

17

6

4

Sequences: a 🡺 c 🡺 b 🡺d 🡺 g 🡺 f 🡺 e

Part 2: -

Set of edges: {a-c, b-c, b-d, e-f, d-f, d-g}