

Test-3 CSC 575 (7 questions, 14.28 x 7 = 100 points)

Name: \_\_\_\_\_

**Question 1**

Apply Horspool's algorithm to search for the pattern BAOBAB in the text

BESS \_KNEW \_ABOUT \_BAOBABS

Answer:

**Question 2**

For the input 30, 20, 56, 75, 31, 19 and hash function  $h(K) = K \bmod 11$

- a. construct the closed hash table.

Answer:

### Question 3

Solve the instance 5, 1, 2, 10, 6 of the coin-row problem.

Help:

$$F(n) = \max\{c_n + F(n-2), F(n-1)\} \text{ for } n > 1,$$

$$F(0) = 0, F(1) = c_1$$

Answer:

#### Question 4

a. Apply the bottom-up dynamic programming algorithm to the following instance of the knapsack problem:

item	weight	value
1	3	\$25
2	2	\$20
3	1	\$15
4	4	\$40
5	5	\$50

, capacity  $W = 6$ .

Help:

Consider instance defined by first  $i$  items and capacity  $j$  ( $j \leq W$ ).

Let  $V[i,j]$  be optimal value of such instance. Then

$$\max \{V[i-1,j], v_i + V[i-1,j - w_i]\} \quad \text{if } j - w_i \geq 0$$

$V[i,j] =$

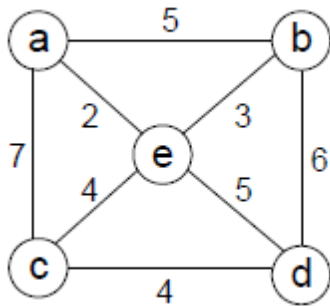
$$V[i-1,j] \quad \text{if } j - w_i < 0$$

Initial conditions:  $V[0,j] = 0$  and  $V[i,0] = 0$

Answer:

### Question 5

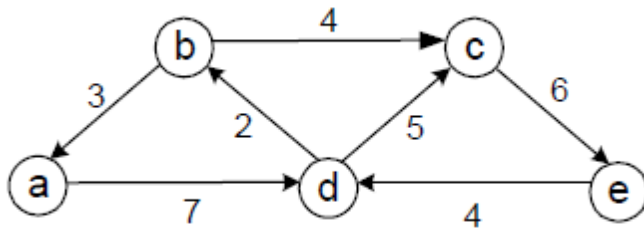
Apply Prim's algorithm to the following graph.



Answer:

**Question 6**

Solve the following instances of the single-source shortest-paths problem with vertex *a* as the source:



Answer:

**Question 7**

Construct a Huffman code for the following data:

character	A	B	C	D	
probability	0.4	0.1	0.2	0.15	0.15

Answer: