Review 8-5

1. The minimum number of scalar multiplications for computing $A_i A_{i+1} \dots A_j$, denoted by $m[i, j]$, is as follows. Fill in the blank.

$$m[i,j] = \begin{cases} 0 & \text{if } i = j \\ \boxed{} & \text{if } i < j \end{cases}$$

2. Compute (a) $m[2, 5]$ and (b) $s[2, 5]$ in the following example and parenthesize (c) the product $A_1 A_2 A_3 A_4 A_5 A_6$ fully to minimize the number of scalar multiplications.

m	1	2	3	4	5	6
1	0	15750	7875	9375	11875	15125
2		0	2625	4375	(a)	10500
3			0	750	2500	5375
4				0	1000	3500
5					0	5000
6						0

s	2	3	4	5	6
1	1	1	3	3	3
2		2	3	(b)	3
3			3	3	3
4				4	5
5					5
6					

matrix	dimension
A_1	30×35
A_2	35×15
A_3	15×5
A_4	5×10
A_5	10×20
A_6	20×25

(a) $m[2, 5] = \min \Big\{$

(b) $s[2, 5] =$

(c) $A_1 \quad A_2 \quad A_3 \quad A_4 \quad A_5 \quad A_6$

3. Fill in the blanks in the following pseudocode for MATRIX-CHAIN-ORDER.

```
MATRIX-CHAIN-ORDER (p)
    n = p.length − 1
    let m [1 .. n, 1 .. n] and s[1 .. n − 1, 2 .. n] be new tables
    for i = 1 to n
        m[ i, i ] = 0
    for l = 2 to n                          // l is the chain length
        for [                    ]
            j = i + l − 1
            m[ i, j ] = ∞
            for k = i to j − 1
                [                                        ]
                if q < m[ i, j ]
                    [                ]
                    [                ]
    return m and s
```

4. Fill in the blanks in the following pseudocode for PRINT-OPTIMAL-PARENS.

```
PRINT-OPTIMAL-PARENS ( s, i, j )
    if [              ]
        print "A_i"
    else print " ( "
        PRINT-OPTIMAL-PARENS ( s, i, s[ i, j ] )
        [                                              ]
        print " ) "
```