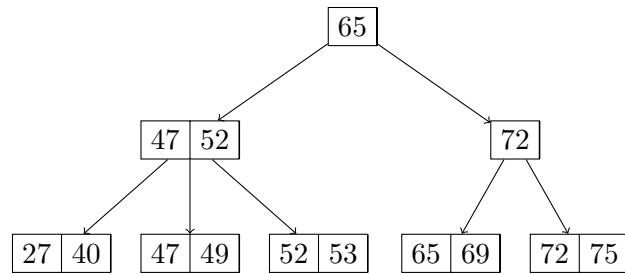Student ID: _____ Name: _____ Section: _____

1. [5 marks] Insert the following keys sequentially in an empty B tree [m = 5]: 35, 49, 46, 47, 51, 33, 34, 45.

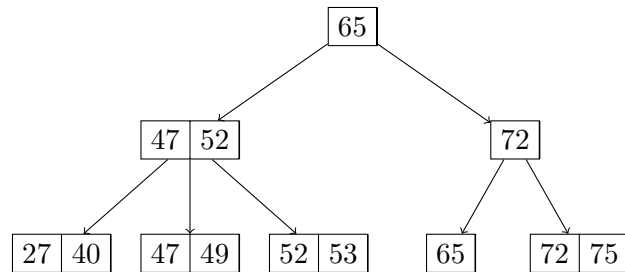   Draw the tree after each key insertion and mention if any operation (merging/rotation/split) is required.

Step 1[if needed]	Step 2[if needed]	Step 3[if needed]
35 Inserting 35	35 | 49 Inserting 49	35 | 46 | 49 Inserting 46
Step 4[if needed]	Step 5[if needed]	Step 6[if needed]
35 | 46 | 47 | 49 Inserting 47	47 ↙ ↘ 35 | 46 49 | 51 Inserting 51 and Split	47 ↙ ↘ 33 | 35 | 46 49 | 51 Inserting 33
Step 7[if needed]	Step 8[if needed]	Step 9[if needed]
47 ↙ ↘ 33 | 34 | 35 | 46 49 | 51 Inserting 34	35 | 47 ↙ ↓ ↘ 33 | 34 45 | 46 49 | 51 Inserting 45 and Split	

2. [5 marks] Draw the tree at each step and mention each type of operation (merging/rotation/split) when the key 69 is deleted from the following B+ tree of order M = 4 and L = 4.
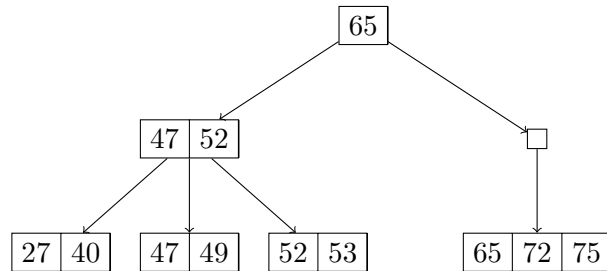
```
                            65
                 47 52              72
          27 40  47 49  52 53  65 69  72 75
```
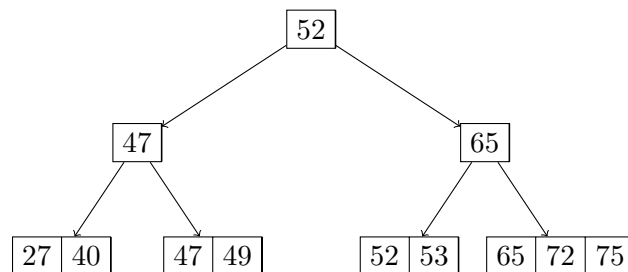
Step 1 [if needed]

```
                            65
                 47 52              72
          27 40  47 49  52 53   65    72 75
```

Underflow at 65

Step 2 [if needed]

```
                    65
             47 52          □
       27 40  47 49  52 53     65 72 75
```

Merging but Underflow Again

Step 3 [if needed]

```
                    52
             47             65
       27 40   47 49    52 53  65 72 75
```

Right Rotation from Left branch