1) Russian Peasant Multiplications

p(n, m)→ n is even → p(n/2, 2m)
→ n is odd → p((n-1)/2, 2m) + m
→ n is 1 → m

1a) 64 * 13

| n | m | N is… |
|---|---|---|
| 64 | 13 | even |
| 32 | 26 | even |
| 16 | 52 | even |
| 8 | 104 | even |
| 4 | 208 | even |
| 2 | 416 | even |
| 1 | 832 | one |

**ANSWER: 832**

1b) 60 * 13

| n | m | N is… |
|---|---|---|
| 60 | 13 | even |
| 30 | 26 | even |
| 15 | 52 | odd |
| 7 | 104 (+52) | odd |
| 3 | 208 (+156) | odd |
| 1 | 416 (+364) | one |

416 + 364 =780

**ANSWER: 780**

1c) 59 * 13

| n | m | N is… |
|---|---|---|
| 59 | 13 | odd |
| 29 | 26 (+13) | odd |
| 14 | 52 (+39) | even |
| 7 | 104 (+39) | odd |
| 3 | 208 (+143) | odd |
| 1 | 416 (+351) | one |

416 + 351
**ANSWER: 767**

2) Lomuto Partition:

Below is the output of my code step by step going through the Lomuto Partition given the following information:

**A** = [100, 33, 22, 213, 65, 29, 153, 199, 47, 181, 85]
**Pivot** = 85

**OUTPUT**

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Initial Array: [100, 33, 22, 213, 65, 29, 153, 199, 47, 181, 85]
Pivot: 85
Elements yet to compare: [100, 33, 22, 213, 65, 29, 153, 199, 47, 181]
For i = 0 and j = 0,
  No swap made: A[i] = 100 A[j] = 100
  Elements lesser than the pivot: []
  Elements greater than the pivot: [33, 22, 213, 65, 29, 153, 199, 47, 181]
  Elements yet to compare: [33, 22, 213, 65, 29, 153, 199, 47, 181]

For i = 0 and j = 1,
  Swap made: A[i] = 33 A[j] = 100
  Elements lesser than the pivot: [33]
  Elements greater than the pivot: [100, 22, 213, 65, 29, 153, 199, 47, 181]
  Elements yet to compare: [22, 213, 65, 29, 153, 199, 47, 181]

For i = 1 and j = 2,
  Swap made: A[i] = 22 A[j] = 100
  Elements lesser than the pivot: [33, 22]
  Elements greater than the pivot: [100, 213, 65, 29, 153, 199, 47, 181]
  Elements yet to compare: [213, 65, 29, 153, 199, 47, 181]

For i = 2 and j = 3,
  No swap made: A[i] = 100 A[j] = 213
  Elements lesser than the pivot: [33, 22]
  Elements greater than the pivot: [213, 65, 29, 153, 199, 47, 181]
  Elements yet to compare: [65, 29, 153, 199, 47, 181]

For i = 2 and j = 4,
  Swap made: A[i] = 65 A[j] = 100

Elements lesser than the pivot: [33, 22, 65]
Elements greater than the pivot: [213, 100, 29, 153, 199, 47, 181]
Elements yet to compare: [29, 153, 199, 47, 181]

For i = 3 and j = 5,
Swap made: A[i] = 29 A[j] = 213
Elements lesser than the pivot: [33, 22, 65, 29]
Elements greater than the pivot: [100, 213, 153, 199, 47, 181]
Elements yet to compare: [153, 199, 47, 181]

For i = 4 and j = 6,
No swap made: A[i] = 100 A[j] = 153
Elements lesser than the pivot: [33, 22, 65, 29]
Elements greater than the pivot: [213, 153, 199, 47, 181]
Elements yet to compare: [199, 47, 181]

For i = 4 and j = 7,
No swap made: A[i] = 100 A[j] = 199
Elements lesser than the pivot: [33, 22, 65, 29]
Elements greater than the pivot: [213, 153, 199, 47, 181]
Elements yet to compare: [47, 181]

For i = 4 and j = 8,
Swap made: A[i] = 47 A[j] = 100
Elements lesser than the pivot: [33, 22, 65, 29, 47]
Elements greater than the pivot: [213, 153, 199, 100, 181]
Elements yet to compare: [181]

For i = 5 and j = 9,
No swap made: A[i] = 213 A[j] = 181
Elements lesser than the pivot: [33, 22, 65, 29, 47]
Elements greater than the pivot: [153, 199, 100, 181]
Elements yet to compare: []

Final result: [33, 22, 65, 29, 47, 85, 153, 199, 100, 181, 213]