Compare the efficiency of the 3 different exercises.

For each program, predict how many instructions will get executed by each program as a function of the exponent.

Then, verify your predictions experimentally.

For 11.5, you will find that it is quite challenging to find a formula for the number of instructions when the exponent is not a power of 2.

Give a formula that only works for exponents that are powers of 2 and test your program with several such exponents.

All experimental results should be presented in a single table.

1… give a precise formula for the number of steps as a function of the exponent

2… state your logic for why the formula should be the one you gave (i.e., by looking at your program)

3… explain how your data matches or fails to match your formula

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Base (b) | Exponent (e) | Algorithm #1 Counter | Algorithm #2 Counter | Algorithm #3 Counter |
| 5 | 5 | 33 | 38 | 82 |
| 5 | 15 | 83 | 78 | 222 |
| 5 | 25 | 133 | 118 | 358 |
| 5 | 35 | 183 | 158 | 498 |
| 5 | 45 | 233 | 198 | 638 |
| 5 | 55 | 283 | 238 | 782 |