5. **The semiempirical mass formula:** In nuclear physics, the semiempirical mass formula is a formula for calculating the approximate nuclear binding energy B of an atomic nucleus

with atomic number Z and mass number A:

$$B = a_1 A - a_2 A^{2/3} - a_3 \frac{Z^2}{A^{1/3}} - a_4 \frac{(A-2Z)^2}{A} + \frac{a_5}{A^{1/2}},$$

where, in units of millions of electron volts, the constants are $a_1 = 15.67$, $a_2 = 17.23$, $a_3 = 0.75$, $a_4 = 93.2$, and

$$a_5 = \begin{cases} 12.0 & \text{if } Z \text{ and } A - Z \text{ are both even,} \\ -12.0 & \text{if } Z \text{ and } A - Z \text{ are both odd,} \\ 0 & \text{otherwise.} \end{cases}$$

Write a program that takes as its input the values of A and Z, and prints out the binding energy for the corresponding atom. Use your program to find the binding energy of an atom with $A = 58$ and $Z = 28$. (The correct answer is around 490 MeV.)

Git CMD - python -i Prob5.py

```
C:\Users\lab\Dropbox\Computational Physics\Jinesh_HW1>python -i Prob5.py
>>> binding_energy(58, 28)
("The atom's binding energy is ", 493.93560680136824, ' MeV.')
>>>
```

1) This function takes in the inputs of atomic number and mass number, in that order.
2) I inputted the numbers 58 and 28 for atomic and mass number respectively to achieve this result.
3) The final result was about 493 MeV for the sample calculation.