Semi empirical mass formula

To calculate the approximate nuclear binding energy B of an atomic nucleus with atomic number Z and mass number A, one can use this semi-empirical formula

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

where in units of million electron volts, a_1=15.8, a_2=18.3, a_3=0.714, and a_4=23.2.

Value of a5 is conditional.
$a_5 = 0$ if A is odd,
$a_5 = 12.$ if both A and Z are even, and
a_5=-12.0 if A is even and Z is odd.

(a) Test code: Write a code to get B for a given Z and A.
Advanced:- Try *np.where* or *np.select* instead of *if*.
ps: I haven't yet succeeded with *np.select*.

(b) Write a program which loads the file *Atomicdata.txt* and plots (i) the binding energy B as a function of A, (ii) the binding energy per nucleon B/A as a function of A. In both plots, represent the nucleus as a circular marker, label it, and connect the markers through a line. **You are not supposed to edit *Atomicdata.txt*.**
Hint: In *np.loadtxt*, use *dtype* and *skiprows*. Check format of *dtype* on *numpy.org* website.

(c) Write a program which takes all values of Z such that $1 \le Z \le 100$, and for each Z, takes all values of A such that $Z \le A \le 3Z$, and find the atom having the largest binding energy per nucleon (B/A). This is the most stable nucleus.

Write the most efficient codes you can!