# Wormhole

(Time Limit: 1 second)

**Problem Description**

* **English**

A wormhole is a [topological](https://en.wikipedia.org/wiki/Topology) feature which is fundamentally a shortcut connecting two separate points in space. In theory, any wormhole might be able to connect extremely far distances such as a billion light years or more, short distances such as a few feet, and even different universes. For a simplified notion of a wormhole, any two points in [space](https://en.wikipedia.org/wiki/Space) can be visualized as a two-dimensional (2D) paper. A wormhole would appear by first folding the paper between two points in the 3D space, attaching one point to the other, and creating a hole by penetrating the paper with a pen between the two points. In other words, the wormhole is similar to a tunnel in the folded 3D space. Therefore, one can enter the wormhole from one point and then re-emerge at another point immediately.

However, wormhole cannot be arbitrarily created between any two points in the space. Scientists have get to understand the dark matters along the straight line between any two points in the space plays a crucial role in the creation of wormhole. In order to form a wormhole, two distant dark matters create a folding energy by binding to each other, and a series of dark matters binding to another set of dark matters can thus fold the 3D space and create a wormhole tunnel between any two distant points. Further study indicates that each dark matter is associated with distinct dark energy. In addition, the stability of a wormhole is related to difference between total dark energy and the distance. If the total energy of any pair of dark matters equals to the distance, an amount of stable energy equal to the distance is obtained. Otherwise, the entire energy is deduced with respect to the difference of total energy to the distance.

For instance, suppose the distance between two points is 10 light years. There are four dark matters (*x*,*y*,*z*,*w*) with energy (2, 2, 8, 8) linearly ordered between two points. Suppose *y* binds to *z* and *x* binds to *w*, this folding creates a wormhole of 10+10=20 stable energy, because the total dark energy of both pairs equal to 10. Suppose energy of four dark matters are (2, 6, 3, 8). The same folding emits a total stable energy of -1+10=9. Note that cross-binding is not allowed (e.g., *x* to *z* and *y* to *w*). Furthermore, if a dark matter does not bind to any one, it decreases the total stable energy by an amount of 0.2\*distance. For example (Figure (a)), if the five dark matters between two points (with distance of 10 light years) contain energy (3, 6, 2, 4, 8) and folded as shown in the figure, the total stable energy of the wormhole is -1+10-(0.2\*10)=7. These singleton dark matters may be also hanging in the heads and tails of the wormhole.



Ten years later, scientists observed that the wormholes are far more complicated than early imagination. In order to maximize the wormhole stability, a wormhole tunnel can be recursively composed of many loop tunnels, where those loop tunnels are only for maximizing stability. For instance (see Figure (b)), given a sequence of 18 dark matters with energy (1, 2, 3, 4 ,5, 4, …, 2, 7, 8, 9) and distance of 10 light years. They can fold into 9 pairs and generate 90 stable energy. Note that each dark matter can only bind to another one or hang as singletons. In other words, it can not simultaneously bind to two or more dark matters.

Given the distance between two points, and a sequence of dark energy from dark matters between two points, you are asked to write a program which computes the maximum stable energy of forming a wormhole.

* **Chinese**

蟲洞是一種可在太空中連接二點的捷徑。理論上，蟲洞可以連接距離數十億光年，或距離幾尺內，甚至可連接在不同太空之任意二點．蟲洞的原理可把空間中任二點，想像成在二維平面紙張上對角線二點．假設從三度空間中將這紙張折疊以結合這二點，蟲洞就如同用筆將這二點刺穿出一個洞，穿越這摺疊紙張以產生此二點間之捷徑．換句話說，蟲洞猶如在高度空間摺疊後產生之穿越通道．因此，任何物體將能從蟲洞之一端瞬間移動至另一端．

然而空間中之任意二點並無法任意產生蟲洞．科學家已經了解在太空中任意二點直線間存在之暗物質，是構成蟲洞的主要物質．為了產生蟲洞，二個暗物質必須結合才能產生折疊能量．而由一群暗物質兩兩結合後所產生之折疊能量，才有機會構成蟲洞，進而改變空間中遙遠二點間之距離．進一步研究指出每個暗物質都帶有不同之暗能量．此外，蟲洞的穩定性跟暗物質總能量與二點距離之差距有關聯性．若二個暗物質結合之總能量等於二點間距離(*d*)，則將能增加總蟲洞穩定能量*d*．反之，此結合能量與距離之差距，將會減少蟲洞穩定能量．

例如，假設二點間之距離為十光年．有四個暗物質(*x*,*y*,*z*,*w*)依序存在二點中間，且分別具有暗能量(2,2,8,8)．若暗物質*y*與*z*結合，且*x*與*w*結合，因為二組暗物質結合總能量等於距離，此種結合方式將產生10+10=20之穩定能量．假設四個暗物質能量改為(2,6,3,8)，且以同樣配對方式結合，則產生之總穩定能量將為-1+10=9焦耳．注意蟲洞並不允許交叉結合之情形(例如*x*結合*z*且*y*結合*w*)， 注意一個暗物質也可能不會與其他暗物質結合，每一單獨存在之暗物質將減少總穩定能量0.2\**d*．例如(見圖(a))，這二點間距離為十光年且五個暗物質含有能量(3,6,2,4,8)．則以圖中之折疊方式將產生-1+10-(0.2\*10)=7穩定能量．請注意這些單獨存在之暗物質也可能懸掛在蟲洞的開頭與結尾．

十年之後，科學家發現真實的蟲洞超出原本的想像．為了整體蟲洞穩定能量最大化，蟲洞其實可能有許多迴圈型蟲洞建構而成，而那些迴圈型蟲洞只是單純為了穩定能量最大化．如給定18個暗物質(見圖(b))，其暗能量依序為(1, 2, 3, 4, 5, 4, …, 2, 7, 8, 9)且距離為10光年．這些暗物質能摺疊成9組完美配對並產生90總穩定能量．請注意每一個暗物質只能與另一個暗物質配對，或者單獨存在．換句話說，每一暗物質不能重複與二個以上之暗物質配對．

給定二點間之距離，以及二點間所有暗物質之能量，請寫出一程式計算出在所有可能折疊方式中，能構成蟲洞之最大穩定能量．

**Technical Specification**

* **English**
  + The distance (*d*) between two points ranges from 1 to 200 light years and is a multiple of 10.
  + The number of dark matters ranges from 4 to 200.
  + The dark energy of each dark matter ranges from 1 to 250 joules.
  + Each pair of binding dark matters with total dark energy equals to *d* will increase the total stable energy with an amount equal to *d*.
  + Each pair of binding dark matters with total energy (*e*) unequal to *d* will decrease the total stable energy with an amount equal to the absolute difference between *e* and *d*.
  + Each singleton dark without binding to any one will reduce total stable energy by 0.2\**d*.
  + No cross binding is allowed, and each dark matter can only bind to at most another one matter.
* **Chinese**
  + 二點間之距離(*d*)為1到200光年，且*d*一定為10的倍數
  + 暗物質數量為4到200
  + 暗能量為1到250
  + 每一對配對成功之暗物質，若暗能量總和等於 *d*，將能增加總穩定能量*d*
  + 每一對配對成功之暗物質，若暗能量總和(*e*)不等於*d*，將會減少總穩定能量，該減少量為*e*與*d*相減之絕對值
  + 每一個單獨存在之暗物質會減少0.2\**d*焦耳之總穩定能量
  + 禁止交叉結合之情形，且每一個暗物質至多只能與另一個暗物質結合

**Input Format**

* **English**

The first line contains the number of test cases, which is followed by each test case consisting of two lines. The first line in each test case is the distance between two points. The second line stores the dark energy associated with each dark matter between these two points, separated by a white space and ended with -1.

* **Chinese**

第一行為測資的數量．往後跟著每一筆皆為二行的測資．每一筆測資第一行為二點間之距離．第二行為二點間所有暗物質之能量，以一空白隔開，以-1數字結尾．

**Output Format**

* **English**

For each test case, output the maximum stable energy that can be generated from these dark matters.

* **Chinese**

針對每一筆測試資料，每一行輸出所有暗物質所能產出之最大穩定能量

**Example**

|  |  |
| --- | --- |
| **Sample Input:** | **Sample Output:** |
| 3  10  2 2 8 8 -1  10  2 6 3 8 -1  10  3 6 2 4 8 -1 | 20  9  7 |