Start of your journey: *start*

End of your journey: *terminal*

All subway lines that pass the start station: *lines*

All subway lines that pass the terminal station: *linet*

**NO TRANSFER**

If element *a* in *lines* and *linet*, then *start* and *terminal* station is on a same line, so we can get to *terminal* station from *start* station without transfer, and it’s the fastest way.

Total run time=the last arrive time of *terminal*- the last departure time of *start*

The last subway time at *start*=the last arrive time of *start*

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All subway station *lines* passed: *start\_station*

All subway station *linet* passed: *terminal\_station*

**ONE TRANSFER**

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If element *a* in *start\_station* and *terminal\_station*，and a is the transfer station *transfer1.*

*traffic\_line1* contains [first-take subway line, net run time on this line, net run time on this line plus walk time to this line plus run interval of this line(Here equals to net run time, because this is the start), the *start* of this line, transfer station]

*traffic\_line2* contains [second-take subway line, net run time on this line, net run time on this line plus walk time to this line plus run interval of this line, transfer station, *terminal*]

*totusetime* contains total use time of all possible ways [total use time, *start*, first-take subway line, *transfer1*, second-take subway line, *terminal*]

*transfer\_beststation* is the transfer station of the shortest used time line

*transfer\_bestline* is the subway lines under the best circumstance

*timeend* is the last time under the best circumstance [the last time of *start* station, the last time of *transfer1*]

(the last time of *start* station= the last time of *transfer1*- interval of second-take subway line –transfer time on foot in the station)

if the last time of *start* station < the last time of *start* station on the time table:

print the last time of *start* station

else:

print the last time of *start* station on the time table

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**TWO TRANSFER**

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If element a in *transfertwo\_station* and *terminal\_station*, then a is the second transfer station *transfertwostaion.*

*traffic\_line1* contains [first-take subway line, net run time on this line, net run time on this line plus walk time to this line plus run interval of this line(Here equals to net run time, because this is the start), the *start* of this line, the first transfer station]

*traffic\_line2* contains [second-take subway line, net run time on this line, net run time on this line plus walk time to this line plus run interval of this line, the first transfer station, the second transfer station]

*traffic\_line3* contains [third-take subway line, net run time on this line, net run time on this line plus walk time to this line plus run interval of this line, the second transfer station, *terminal*]

*totusetime* contains total use time of all possible ways [total use time, *start*, first-take subway line, the first transfer station, second-take subway line, the second transfer station, third-take subway line, *terminal*]

*transfer\_beststation* is the transfer station of the shortest used time line

*transfer\_bestline* is the subway lines under the best circumstance

*endtime\_2* is the last time in the second transfer station, equals to the last arrival time of this station on the third-take subway line in the time table

*endtime\_1* is the last time in the first transfer station, equals to min[(*endtime\_2* minus the net run time of the second-take subway line minus the stop time of the third-take subway line at the second transfer station minus the transfer time in the second transfer station by foot minus the run interval of the third-take subway line), the last arrival time of the first transfer station on the second-take subway line in the time table ]

*endtime\_0* is the last time in the *start* station, equals to min[(*endtime\_1* minus the net run time of the first-take subway line minus the stop time of the second-take subway line at the first transfer station minus the transfer time in the first transfer station by foot minus the run interval of the second-take subway line), the last arrival time of the *start* station on the first-take subway line in the time table)]

*timeend* is the last time under the best circumstance [the last time of *start* station, the last time of *transfer1*]

出发站的末班车时间endtime\_0=min[(endtime\_2-第一个线的净运行时间-第一个换乘站停留时间-第一个换乘站内换乘时间-第二个线的时间间隔),出发站在第一个线的末班车时间]

timeend为最优情况下的[出发点的最晚时间,换乘点1的最晚时间,换乘站2的最晚时间]

**三次换乘**

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start lines start\_station trans2\_line trans2\_station trans3\_lines trans3\_station

terminal\_station linet terminal

原理和二次换乘类似

只是用trans3\_station和terminal\_station共有的元素作为第三换乘点，然后反推前面的可行路线。

**最短总运行时间比较**

当不用换乘时，此路径为最短

当可以换乘一次时，

如果能换乘两次，会计算换乘两次的所有方案总运行时间，返回最优方案和所有换乘一次和换乘两次的方案

如果只能换乘一次，此时为最短路径

当可以换乘两次时，会计算换乘三次的所有方案总运行时间，返回最优方案和所有换乘两次次和换乘三次的方案

如果只能换乘两次，此时为最短路径

只能换乘三次时，此时为最短路径

其余情况返回空