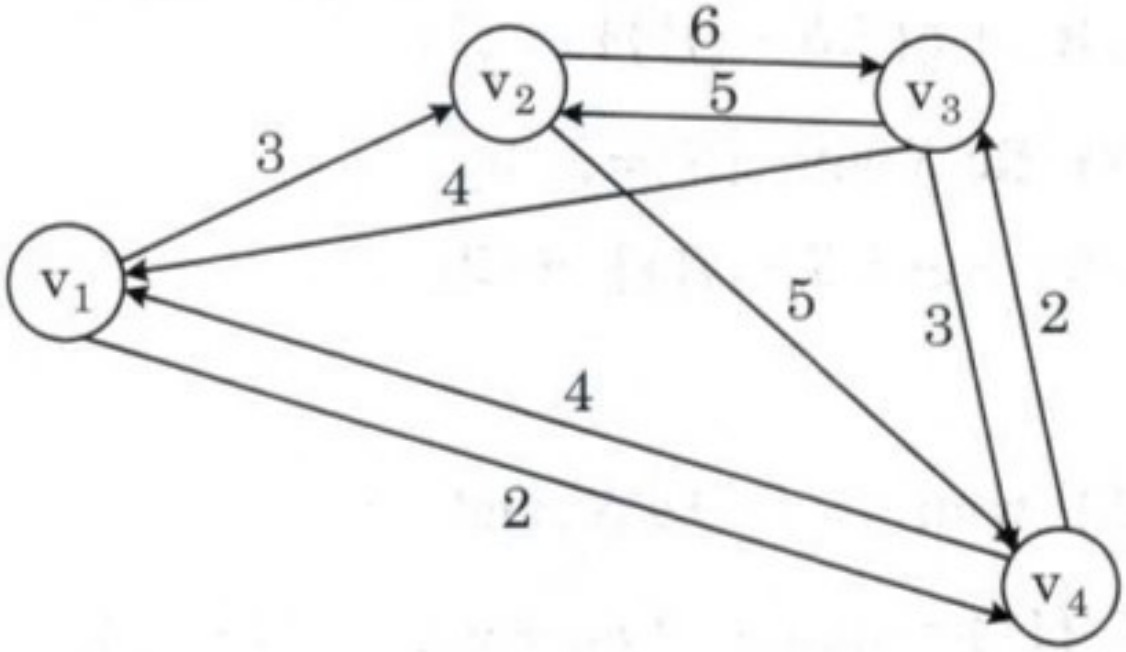
Please find the length of an optimal tour of the following graph (with $v1$ as the source vertex) [Traveling Salesperson Problem]:



in case of employing the Dynamic Programming algorithm (Please show the action step by step.)

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Ans.

令 $g(i,S)$ 為自 i 點到 S 中所有點再到點 1 之最短長度路徑。

1. $|S|=0$

$g(2,\phi)=\infty$

$g(3,\phi)=4$

$g(4,\phi)=4$

2. $|S|=1$

$g(2,\{3\})=6+4=10$

$g(2,\{4\})=5+4=9$

$g(3,\{2\})=5+\infty=\infty$

$g(3,\{4\})=3+4=7$

$g(4,\{2\})=\infty+\infty=\infty$

$g(4,\{3\})=2+4=6$

⋮

3. $|S|=2$

$g(2,\{3,4\})=\min(C_{23}+g(3,\{4\}),\ C_{24}+g(4,\{3\}))=\min(6+7=13,\ 5+6=11)=11$

$g(3,\{2,4\})=\min(C_{32}+g(2,\{4\}),\ C_{34}+g(4,\{2\}))=\min(5+9=14,\ \infty)=14$

$g(4,\{2,3\})=\min(C_{42}+g(2,\{3\}),\ C_{43}+g(3,\{2\}))=\min(\infty,\ 2+\infty)=\infty$

4. $g(1,\{2,3,4\})=\min(C_{12}+g(2,\{3,4\}),\ C_{13}+g(3,\{2,4\}),\ C_{14}+g(4,\{2,3\}))$

$=\min(3+11=14,\ \infty+14=\infty,\ 2+\infty=\infty)=14$ ＊