

(a) [b11209013@study hw2]\$ cat hw2a.py

```
#import math
import math as m

# establish list U, V
U = [1.112,1.050,1.998,-1.489]
V = [2.164,1.483,0.377,-0.289]

# establish array WS, WD
WS = []
WD = []

#convert U, V into WS and WD
for i in range(4):

    tan = V[i]/U[i]
    angle = m.atan(tan)

    speed = abs(V[i])/(m.sin(angle))
    speed = round(speed,3)
    WS.append(speed)

    angle = m.degrees(angle)
    if U[i]<0:
        phi = 90-angle
        phi = round(phi,1)
    elif U[i]>0:
        phi = 270-angle
        phi = round(phi,1)
    WD.append(phi)

# output WS,WD array
print(WS)
print(WD)
```

```
[b11209013@study hw2]$ python hw2a.py
[2.433, 1.817, 2.033, 1.517]
[207.2, 215.3, 259.3, 79.0]
```

(b)

```
import math as m
```

```
# open hw2_data.txt and read the first line
```

```
f0 = open("hw2_data.txt","r")
```

```
f0.readline()
```

```
f1 = open("hw2b.txt","w")
```

```
#write headline of hw2b.txt
```

```
f1.write('Time[hh:mm]+'+'u[m/s]+'+'v[m/s]+'+'WS[m/s]+'+'WD[deg]+'\\n')
```

```
# read data of each row
```

```
for i in range(1,25):
```

```
    a = f0.readline()
```

```
    b = a.split(' ')
```

```
#round WS and WD
```

```
    WS = float(b[7])
```

```
    WS = round(WS,1)
```

```
    b = b[::-1]
```

```
    WD = float(b[0])
```

```
    WD = round(WD,1)
```

```
    b = b[::-1]
```

```
#compute U and V
```

```
    U = WS*m.cos(m.radians(270-WD))
```

```
    U = round(U,1)
```

```
    V = WS*m.sin(m.radians(270-WD))
```

```
    V = round(V,1)
```

```
# convert WS and WD into string
```

```
    WS = str(WS)
```

```
    WD = str(WD)
```

```
#write data into hw2b.txt
```

```
    if U<0 and V<0:
```

```
        U = str(U)
```

```
        V = str(V)
```

```
        f1.write(b[0]+' '+U+' '+V+' '+WS+' '+WD+'\\n')
```

```

elif U<0 and V>0:
    U = str(U)
    V = str(V)
    f1.write(b[0]+' '+U+' '+V+' '+WS+' '+WD+'\n')
elif U>0 and V<0:
    U = str(U)
    V = str(V)
    f1.write(b[0]+' '+U+' '+V+' '+WS+' '+WD+'\n')
else :
    U = str(U)
    V = str(V)
    f1.write(b[0]+' '+U+' '+V+' '+WS+' '+WD+'\n')

# close hw2_data.txt and hw2b.txt
f0.close()
f1.close()

```

Time[hh:mm]	u[m/s]	v[m/s]	WS[m/s]	WD[deg]
00:00	1.1	2.1	2.4	207.2
01:00	1.6	1.3	2.0	231.3
02:00	2.3	2.2	3.2	227.2
03:00	0.8	1.1	1.4	216.2
04:00	2.0	0.7	2.1	250.0
05:00	1.6	1.8	2.4	222.3
06:00	1.0	1.5	1.8	215.3
07:00	2.5	0.4	2.5	260.3
08:00	3.1	0.7	3.2	257.0
09:00	1.5	1.0	1.8	234.5
10:00	1.6	1.4	2.1	229.5
11:00	3.2	1.8	3.7	241.0
12:00	2.0	0.4	2.0	259.3
13:00	1.7	0.2	1.7	261.8
14:00	2.0	-0.1	2.0	272.2
15:00	2.7	-0.1	2.7	271.2
16:00	2.3	0.8	2.4	251.7
17:00	2.4	0.2	2.4	265.8
18:00	-1.5	-0.3	1.5	79.0
19:00	0.4	1.2	1.3	197.7
20:00	1.0	1.9	2.1	208.2
21:00	2.2	1.0	2.4	246.2
22:00	1.9	1.3	2.3	234.2
23:00	2.3	0.6	2.4	255.2