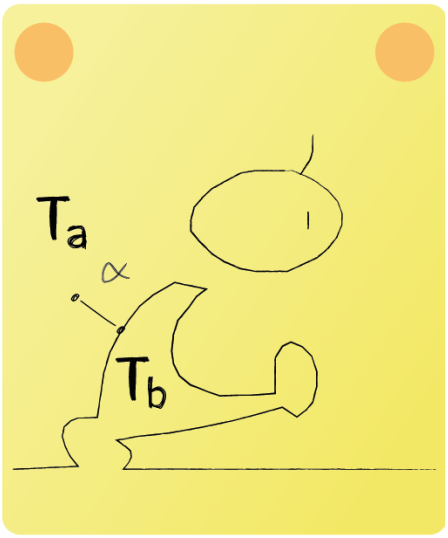
Lecture 6 Question 5

A man is walking. Assume its body temperature to be homogeneous and constant at $T_b = 37$ °C in all cases and neglect the effect of difference in air properties.
At which place will is the rate of heat transfer $\dot{Q}$ the greatest? List them from high to low.



1. On the north Pole with no wind and a temperature of $T_a = -60$ °C
2. In the Mojave Desert with some wind and a temperature of $T_a = 35$ °C.
3. In the Sahara Desert with no wind and a temperature of $T_a = 35$ °C.

We know:

$$\dot{Q}_{conv} = \alpha \cdot A_s \cdot (T_b - T_a)$$

The big difference between the body and air temperature $(T_b - T_a)$ on the north Pole, will cause the rate of heat transfer to be the biggest.

As the temperature is the same in the Mojave and Sahara Desert, the fact that there is some wind in the Mojave Desert will increase the heat transfer coefficient α as a result of the increase in fluid motion.