1.1) Case Presentation: Hill Climb Hell

You're training for a marathon and it's your hill climb day. After 1.5 miles of a constant incline, your thighs start to feel weak, your calves feel like they're burning and are starting to tighten up. You take a short break and feel your left calf and it's as hard as steel! A short rest isn't cutting it, so you lay in the grass for 5 minutes more with your hands over your head. After 5 minutes, the burning has gone away, and your thighs aren't feeling weak any longer. You chalk it up to a heavy case of lactic acid build up.

a) List 3 key symptoms in the scenario above.

b) What major organs or body structures are involved in the scenario above and what system are they part of? Record in the table below.

Organs or structures involved	Body system

c) Discuss TWO different interactions that allowed your body to recover from the intense hill climb.

1.2) Case Presentation:

It was the fourth straight day of temperatures above the 100-degree Fahrenheit mark. Janice's mother, Marian, was eighty-four and in pretty good health. She was able to keep up with her housekeeping and still tended a small garden in her backyard. Just that morning, Janice had told her mother not to spend too much time working in the garden that day. Janice knew that the heat could be dangerous, especially to the elderly, and her mother's house didn't have an air conditioner, but Janice felt that her mother was alert enough to know her own limits. Janice told her mother that she would stop by after running a few errands.

When Janice reached her mother's house, she found her mother unconscious on the couch in the living room. All the windows in the house were closed. Janice immediately tried to wake up her mother and was only able to get her to say a few words, but Marian seemed delirious. Janice grabbed the telephone and called for help.

The emergency services operator instructed Janice to apply a cold wash cloth(s) to her mother's forehead and face and if possible to position her mother in front of a fan while using a spray bottle to spray tepid water on her skin. When the paramedics arrived, Marian was conscious but was confused and feeling nauseous. At the hospital the doctor told Janice just how lucky she was. He informed Janice that Marian had suffered heatstroke, a form of hyperthermia and that Janice's quick action at the house had saved her mother's life. Marian was making rapid progress to recovery but was being given fluids and electrolytes intravenously and was going to stay in the hospital overnight for observation.

Case Background

Hyperthermia occurs when the body temperature increases without an increase in the set point of the thermoregulatory center in the hypothalamus. Heat exhaustion and heatstroke are two common forms of hyperthermia. Symptoms of heat exhaustion include thirst, fatigue, profuse sweat, and giddiness or delirium. Individuals with heat exhaustion generally have a normal or only slightly elevated body temperature and the symptoms are the result of the loss of water and electrolytes. Symptoms of heatstroke include a temperature of 104EF, absence of sweating, and loss of consciousness. If untreated, heat exhaustion precedes heatstroke, and heatstroke is often fatal. Treatment for hyperthermia consists of reducing the body temperature to normal. Special attention is placed on reducing the temperature of the brain as tissue damage can result if the body temperature rises above 109-degrees Fahrenheit.

1) Define homeostasis and describe how it relates to hyperthermia. (Use the following terms in your response: receptors, set point, control center, and effectors).

2) Explain why elderly individuals with poor circulation would have a greater risk of suffering heat exhaustion or heatstroke.

3) Explain why spraying water on the skin while sitting in front of a fan would lower body temperature.

4) When attempting to lower a person's body temperature in response to hyperthermia one should avoid treatments that induce shivering or vasoconstriction. Why?