Please provide concise, grammatically correct, neatly written answers to the following questions. All questions can be answered in, at most, a few sentences. Don’t forget to write your name on the paper!!!

NAME:

1) The diagram below shows the isobars at 5.4 km above sea-level. The following questions relate to this diagram.

(a) Mark the locations of the trough axes with a solid line (2.5 pts)

(b) Mark the location of the ridge axis with a dashed line. (2.5 pts)

(c) Indicate the locations of largest positive vorticity with X’s. (5 pts)

(d) Where will the surface cyclones likely be located? Explain your answer with reference to vorticity advection and its relationship to vertical motion. (10 pts)
2) The diagram below represents a surface cyclone in the Northern Hemisphere.

(a) Draw the surface winds at pts A and B and indicate the relative temperatures at these points (i.e. tell me which one is warmer/colder) (5 pts)

(b) In which direction is the cold air headed? (2.5 pts)

(c) In which direction is the warm air headed? (2.5 pts)

Recall that tropical latitudes are characterized by a surplus of radiant energy while the middle and high latitudes are characterized by a deficit (see page 64 in the book for a reminder if necessary).

(d) Based on your answers in (a), (b), and (c), explain how this cyclone helps to alleviate this energy surplus/deficit situation. (10 pts)
EXTRA CREDIT:

Imagine a train of Northern Hemisphere surface cyclones and anticyclones are placed in a region with thickness lines oriented east-west as depicted below.

![Diagram of surface cyclones and anticyclones]

a) Draw the north-south winds that characterize this train of cyclones and anticyclones and indicate how the thickness line will be deformed by this flow. (5 pts)

b) Given that sea-level pressure disturbances move in the direction of the thermal wind, explain why cyclones head poleward and anticyclones tend to head equatorward. (5 pts)