

Name _____

1. The summit of Mt Everest is 8.85 km above sea level. Assume that the temperature and pressure vary as specified in the standard atmosphere, sea-level temperature = 15.15°C , sea-level pressure = 1013 hPa, and lapse rate of $6.5^{\circ}\text{ km}^{-1}$. What is the average of the sea-level and summit temperatures? What is the effective scale height between sea-level and the summit? What is the standard atmosphere pressure at the altitude of Mt. Everest's summit?

2. Suppose that two observing stations are at 40°N , where the Coriolis parameter is 10^{-4} . Station A, where the pressure is 1015 hPa, is 1000 km distant from Station B, where the pressure is 1009 hPa.
 - a. What would the speed of the steady geostrophic wind blowing perpendicular to the line between them be? Remember that you need to multiply by 100 to convert hPa to Pascals ($\text{kg m s}^{-2}/\text{m}^2$ or $\text{kg m}^{-1} \text{s}^{-2}$). Assume that the average density of air is constant at 1.2 kg m^{-3} . Neglect friction.
 - b. If station A (higher pressure) is east of station B (lower pressure) would that wind blow from the north or from the south?
 - c. Suppose the stations moved to 20°S latitude where the Coriolis is $-0.5 \times 10^{-4} \text{ s}^{-1}$, what would the wind speed be (keeping the same pressure difference)?
 - d. Would the wind blow from the north or south?

3. It is two bells in the evening watch on 18 August 1841. You are the captain of the Clipper Ship *Nathaniel Bowditch* heading east across the Philippine Sea at 12°N under single-reefed topsails and t'gallents, with a cargo of tea from Shanghai. The barometer is at 998 mb and the wind is a fresh gale from the N. What is the direction to the center of the Typhoon? What course should you tell the watch officers to steer for the rest of this night? Is your present situation better or worse than it would be if the wind were from the NE?