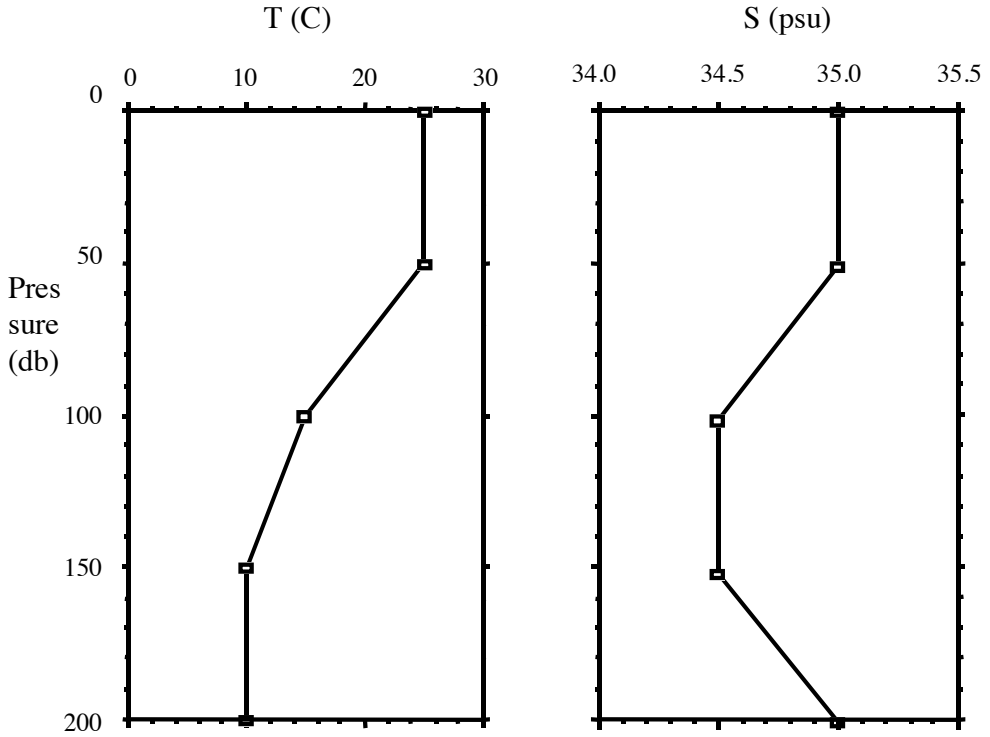
Geography 163 **Homework 1** **Due 22 April 2008**

1) Calculate profiles of $\rho(S,T,p)$, σ_θ, σ_t and potential temperature (θ) corresponding to the T and S profile given shown below. Make a table and plots. Temperature can be measured accurately to within 0.002 C and salinity to 0.001 psu. So, please be careful with the number of significant digits you report in your table. You should use an on-line seawater property calculator, such as http://www.phys.ocean.dal.ca/~kelley/seawater/WaterProperties.html. Also, between which depths (or pressure surfaces) does the density increase the most rapidly?



Pressure (db)	T (C)	S (psu)
0	25.00	35.00
50	25.00	35.00
100	15.00	34.50
150	10.00	34.50
200	10.00	35.00

2) Explain the spiraling nature of a Hadley cell (write 3 to 5 complete sentences – also draw a picture!). What are the surface winds due to a Hadley cell called? How do Hadley cells contribute to the global heat budget?

3) You have measured the temperature and salinity of three water masses. These values are listed in the table below. Rate the buoyancy of the three water masses in increasing order. Will any these water masses mix easily in the vertical? Which ones and why/why not? Assume a pressure of 100 db. Is the pressure surface an important assumption?

Water Mass	Temperature (C)	Salinity (psu)
1	22.000	36.000
2	20.000	35.000
3	16.040	34.000

4) Make some maps from an ocean data climatology. Go to the live access server for climate data (http://ferret.pmel.noaa.gov/NVODS/servlets/dataset) and select "World Ocean Atlas 2001 1x1 degree Annual means" from the list of datasets. Choose a parameter of your choice and make a longitude-depth, latitude-depth and longitude-latitude plot (you want to work with "analyzed" fields). Print these plots out (B/W is fine). Make up a story about how you think water masses are connected in the three plots. Be creative and have fun with this (it's OK to make more than 3 plots and use these to tell a cool story).

5) Explain why motions are deflected to the right in the northern hemisphere. Why is it important? Draw a picture too… Write a couple sentences that concisely explain what's going on.

6) Calculate the inertial period at 34°N. What is it at 2°S? At what latitude would the inertial period be exactly 24 hours? What is the radius of an inertial circle generated by a drifter moving at 10 cm s^{-1} at a latitude of 34°N? What if the drifter was moving only 1 cm s^{-1}?