ATSC 201 **Final Exam** Name: _____
Prof. Stull (open books, notes, calculator)
Fall 2014 (90 points ≈ 1 minute/point) Student Number: _____

1) (1 point) What type of cloud was over UBC at the start of this exam? _____

2) a) (14 points) Given the first attached weather map, draw the isotherms for the temperatures indicated in the bottom right corner of the map. Be sure to label each isotherm.
b) (1 point) Label the "Warm" and "Cold" centers, and be sure to put your name on that map.
c) (2 points) Just under your warm and cold labels, add the appropriate airmass abbreviation (2 letters).

3) a) (14 points) Use the second attached weather map (which is identical to the first one) and draw the isobars for the pressures indicated in the bottom right corner of the map. Be sure to label each isobar.
b) (1 point) Label the Low "L" and High "H" pressure centers, and be sure to put your name on that map.

4) (6 points) Use your analyses maps from questions 2 & 3, along with other information on the map (such as wind directions) to find 2 cold fronts. Draw these fronts on ONLY the isobar map (from question 3).

5) (6 points) Given the appearance of the satellite image as given in the table below, write the cloud type in the right column of the table.

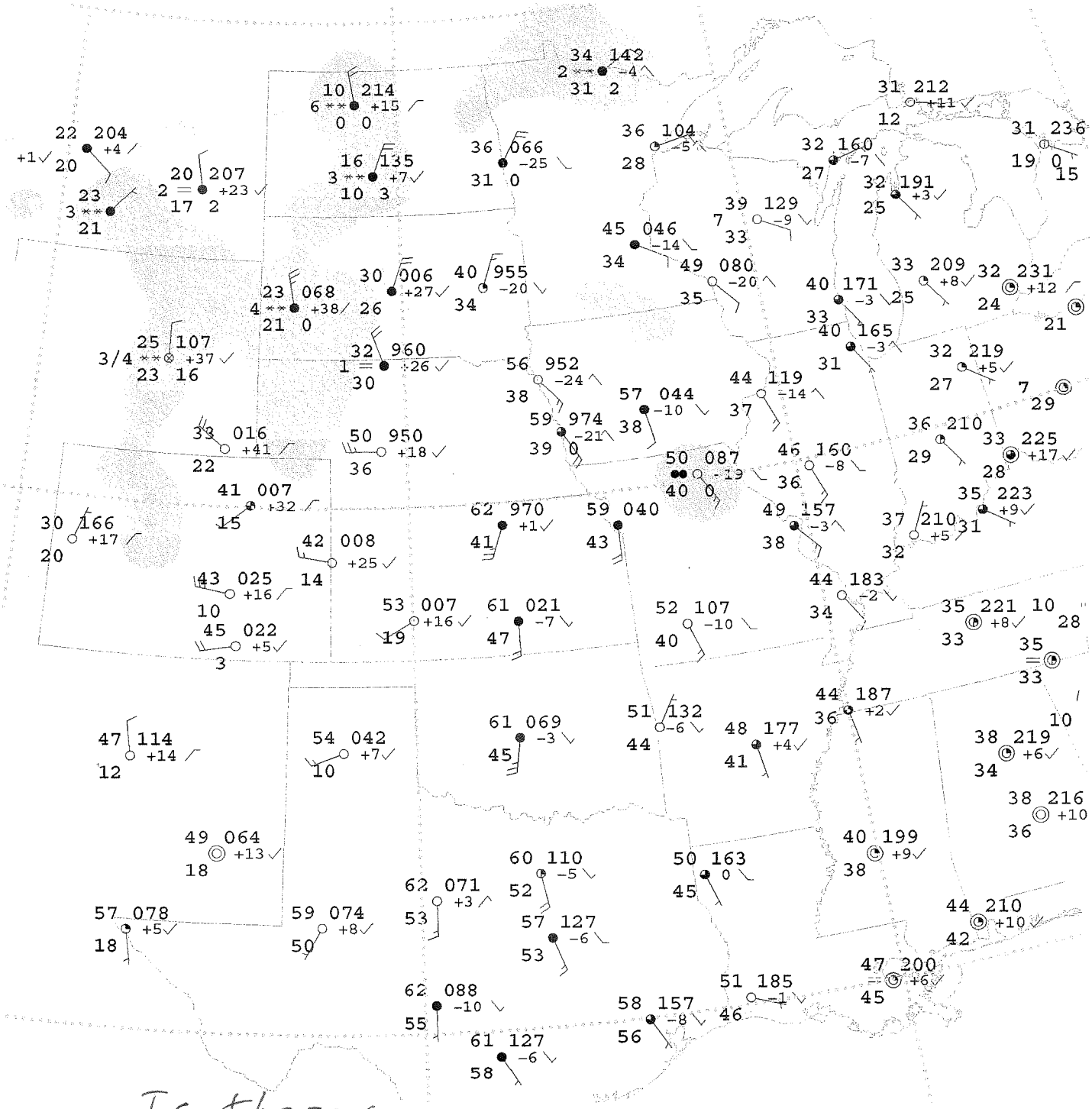
	Visible channel	Infrared channel	Water-vapour channel	Cloud Type
a)	white	white	medium grey	
b)	white	medium grey	dark grey or invisible	
c)	white	white	white	

6) (3 points)? What drives the polar jet stream?

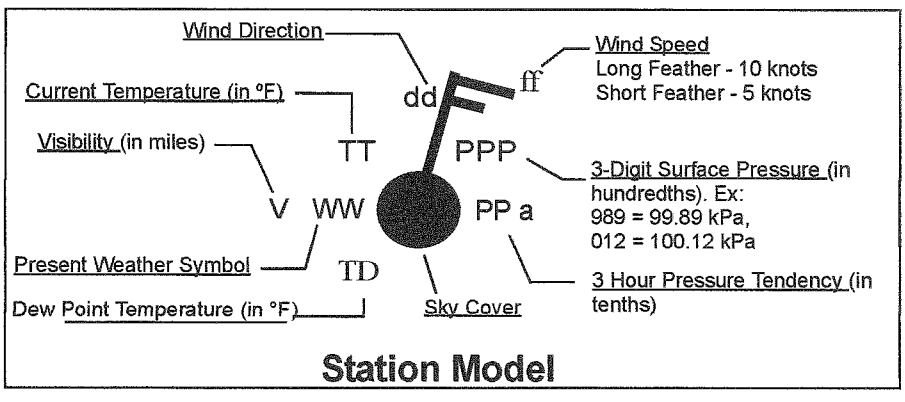
7) (3 points)? What drives the subtropical jet stream?

8) (5 points)? List all the phenomena that we learned in this class that depend on (or can be explained by) the **conservation of potential vorticity**.

9) (2 pts) The wind direction of the trade winds in the N. Hemisphere is _____ .



Isotherms



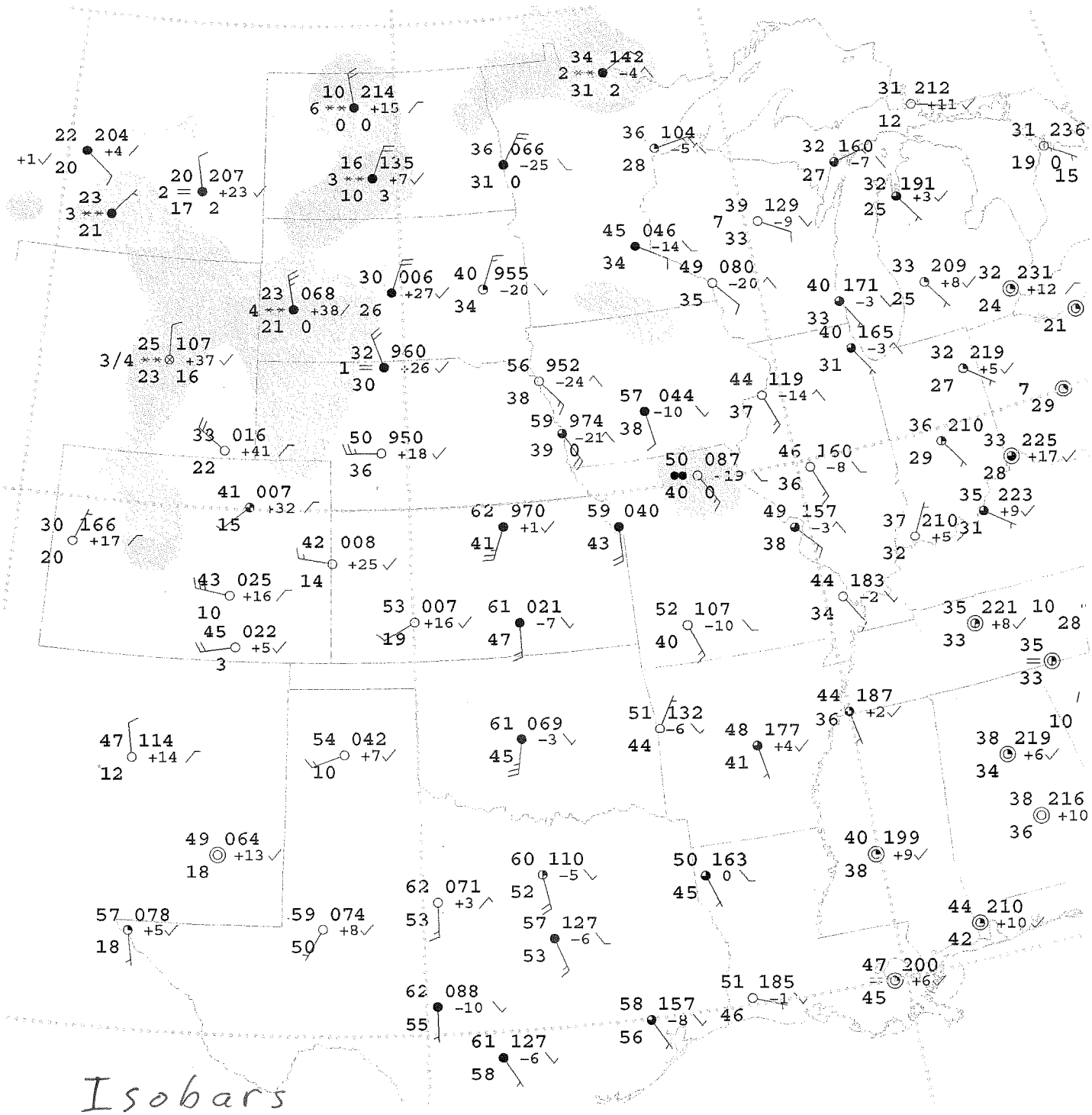
Station Model

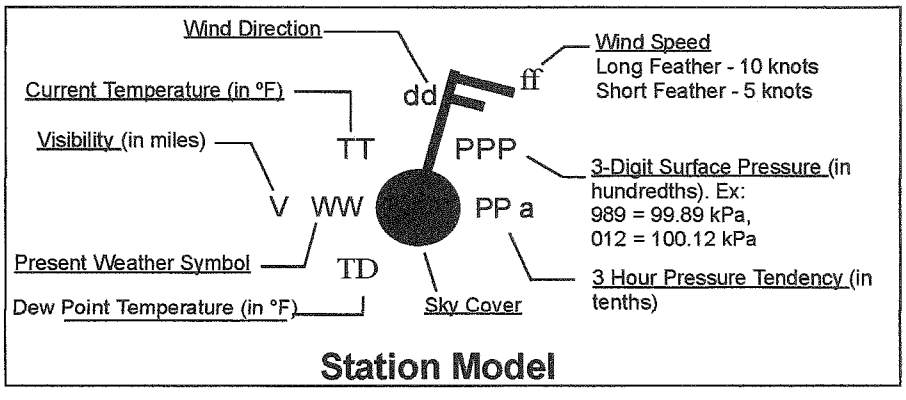
Name: _____

SN: _____

a) Draw isotherms (°F)
10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

b) Label Warm and Cold centers.





Name: _____

SN: _____

Draw isobars (kPa)
a) 99.6, 100.0, 100.4, 100.8, 101.2, 101.6, 102.0

b) Label High (H) and Low (L) pressure centers.

10)

(5 points)? List all the phenomena that we learned in this class that depend on (or can be explained by) the **hypsometric** equation.

11)

Given: a location at 60°N along the BC coast. Calm geostrophic winds at the Earth's surface. A baroclinic zone is aligned north-south near the coast, such that the virtual temperature changes from 0°C to –20°C as you travel 200 km toward the west across this zone.

(a) (3 pts) The value of the Coriolis parameter at this location is _____

(b) (5 pts) What is the vertical gradient of geostrophic wind (i.e., the change of geostrophic wind with height) at this location?

(c) (1 pt) At 2 km above the ground, what is the geostrophic wind direction? _____

12) a) (2 pts) The west-to-east polar jet stream has _____ instability, which causes it to meander north and south in a pattern that is called a _____ wave .

b) (3 pts). In the equations for this wave is a beta parameter. At 60°N, β = _____ .

c) (5 pts). If the wavelength is 5000 km, then the value of the intrinsic phase speed is _____ .

13)

(3 pts). Why is the north-south meander of the jet stream important for mid-latitude weather?

14) a) (2 pts) Two processes that can cause cyclogeneis are: _____ and _____.

b) (1 pt) One processes that always tries to cause cyclolysis is _____.

15) a) (1 pt) Tropical cyclones with tangential wind speed of 225 km/h correspond to a category _____ storm on the Saffir-Simpson scale.

b) (1 pt) What is the importance of the "warm core" of a hurricane/typhoon/tropical cyclone? (circle **one**)

- causes relatively high pressure at the tropopause over the eye
- causes relatively low pressure at the tropopause over the eye
- allows the air to hold more water vapour, resulting in less precipitation
- creates sufficient buoyancy to allow the eyewall thunderstorms to penetrate into the mid stratosphere.
- increases the infrared radiation lost from the storm top, causing the core to become a "cold core".

-end-