

Name: _____

NATS 101 Introduction to Weather and Climate, Section 54, Fall 2005
Homework #1: Solutions

1. List three permanent gases and their percent by volume values for dry air. [7] State to what depth in the atmosphere the ratios of these gases remains nearly constant. [6] What is the name of this layer within which these ratios are constant? [7]

Nitrogen 78%, Oxygen 21%, Argon 1%

Base of the thermosphere or about 90 km (56 mi).

The layer is called the homosphere.

2. List 4 variable gases. [10] Identify which, if any, of the variable gases you chose are greenhouse gases? tropospheric pollutants? [10]

Any 4 of these would be ok:

Nitrogen Dioxide/Nitric Oxide (NO_2/NO) - tropospheric pollutants

Ozone (O_3) - tropospheric pollutant

Water Vapor (H_2O) - greenhouse gas

Carbon Dioxide (CO_2) - greenhouse gas

Nitrous Oxide (N_2O) - greenhouse gas

Sulfur Dioxide (SO_2) - tropospheric pollutant

3. Precipitation across Arizona varies tremendously from location to location due to many features, some of which include predominant storm tracks as well as the existence of mountainous regions. We will compare five locations across the state and consider their average annual precipitation. [20]

Look at the map found on the Homework Page link for this course under HW1 or at http://www.atmo.arizona.edu/students/courselinks/fall05/nats101s54/HW1_azprecip.html. The locations of Tucson, Mt Wrightson, Phoenix, Flagstaff, and Yuma have been marked. From the map, use the 1961-1990 average annual precipitation shown across Arizona to rank the amounts of precipitation received at these locations, on average, from wettest to driest. Be sure to also include the precipitation amounts (the range shown on the map).

		Location	Average Annual Precipitation (inches)
Wettest	1	Mt. Wrightson	30-38 in per year
	2	Flagstaff	26-30 in per year
	3	Tucson	12-14 in per year
	4	Phoenix	8-10 in per year
Driest	5	Yuma	<4 in per year

4. Specify whether the following measurements describe weather or climate:

	Weather	Climate
Mean August rainfall at Mt Lemmon [4]		x
Measured dew point in New Orleans, Louisiana last Monday [4]	x	
Record high temperature in Tucson for July 15 th [4]		x
Highest recorded wind speed in Yuma on 1 March 2002 [4]	x	
Average number of clear days per year in Phoenix [4]		x

5. The following figure shows a sounding (temperatures at different heights or pressure levels) from Green Bay Wisconsin provided by Unisys. This sounding was taken at 00:00 UTC on 31 August 2005 (5:00 pm on 30 August Tucson time). Use it to answer the questions that follow:

Skew T diagram A Skew T plot is a standard plot used by meteorologists to analyze data from a balloon sounding. This is a plot of temperature with height as denoted by pressure. The pressure lines are plotted horizontally in yellow and are also on an inverse log scale. The concept of Skew T means that the temperature is not plotted vertically but angles off to the right at a 45 degree angle. The constant temperature lines of the Skew T are blue in this figure (45° lines), as are the constant pressure lines (horizontal lines). The sounding is plotted as two black lines. The right line is the temperature profile. The left line is the dewpoint profile. The winds are plotted as wind barbs with height on the right edge of the plot. Temperatures are marked on the bottom in degree C as well as along select constant temperature lines for reference. Pressure is marked along the left axis in millibars. Height is also indicated in meters.

