**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Introduction to Meteorology**

**Homework #5 (Chapters 9 and 10)**

**Due: Friday, December 5**

1. What is the first, and possibly the most important requirement for producing an

accurate weather forecast?

2. a) What government organization in the U.S., located near Washington D.C., is

responsible for analyzing data, preparing weather maps and using super computers to run forecast models utilized for predicting the weather?

b) What government organization is responsible for issuing local and regional

weather forecasts, as well as hazardous weather watches and warnings?

c) Both of these organizations are part of what larger government agency?

3. a) What does a hazardous weather ***watch*** indicate?

b) What does a ***warning*** indicate?

4. a) What is visualized in ***visible*** satellite images?

b) What is the ***disadvantage*** of using these types of satellite images?

c) What is brighter on an ***infrared*** satellite image cirrus clouds or stratus clouds?

Why?

5. Twice each day, thousands of observations are transmitted to NCEP and fed

into their high speed “supercomputer” which plots and draws lines on surface and upper-air maps. These generated maps are referred to as an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. After this initial process is complete, the computer then forecasts how this analysis of the atmosphere will change over time by using mathematical equations that govern the behavior of the atmosphere. This process is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. What are the **“atmospheric models”** that are utilized to execute this process?

7. How does the meteorologist use the computer models as **“guidance”** to make

his/her final forecast?

8. What are the three basic sources of errors in computer model forecasts?

9. **Global models** are better at forecasting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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whereas **high-resolutions models** are better at forecasting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. **Chaos** theory states that small errors in observations and forecasts tend to

become \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as the computer model projects further into the future. Therefore, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_forecasts are inherently better than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forecasts and there is a limit to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a forecast can be made with any skill.

11. a) What does it mean if there is a 70% probability of precipitation?

b) What is the probability that it will rain at your house?

12. How much cloud cover can you expect if the forecast is “partly sunny”?

13. Is there any “skill” to the forecast on the “Accuweather” website forecasting rain

with a high temperature of 38 degrees for Pittsfield in 14 days?

14. a) What is a thunderstorm (definition)?

b) What type of environment do they form in?

15. What constitutes a **“severe”** thunderstorm?

16. a) Are ordinary (air mass/single-cell) thunderstorms usually severe?

b) Are they “long-lived” thunderstorms?

c) What is it about these thunderstorms ***environment***, and what does this do to

the ***structure*** of these thunderstorms that results in the answer to a) and b)?

17. What is a “gust front”?

18. a) What is a “downburst/microburst”?

b) In what two ways does this phenomenon cause damage/disasters?

19. a) What is lightning?

b) What is thunder?

20. a) Where can lightning strikes take place?

b) Where do the majority occur?

21. What part of the lightning stroke do we usually see?

22. a) Which is more common, negative or positive cloud-to-ground lightning?

b) Which is more dangerous? Why?

23. a) Where are most victims when they are struck by lightning? Why?

b) When is it recommended that people seek cover from an approaching

thunderstorm?

24. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are (by far) the most

intense thunderstorms and are responsible for most of the damaging hail and straight line winds and virtually all damaging tornadoes.

25. What percentage of supercell thunderstorms produce a tornado?

26. a) What is a tornado?

b) Where are they most common?

c) What time of year are they most common?

d) What time of day are they most common?

27. a) What is the classification scale for tornadoes called?

b) What is it based upon?

28. **Doppler radar** provides more definitive evidence of a supercell thunderstorm,

and has permitted forecasters to provide tornado warnings, on average, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_before a tornado forms since it can detect \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a thunderstorm?

29. a) When is a tornado ***watch*** issued?

b) When is a tornado ***warning*** issued?

30. a) Where is the best place to take shelter from a tornado if you are in the vicinity

of buildings?

b) Where is the best place if you are outdoors or on the road?