This is a take-home test, so you may use your book, notes, etc. Also, the following rules apply to play:

- The test is due Tuesday, March 6, 2007 at the beginning of class. Not after class, not Wednesday, and not whenever you kind of just feel like it. The test will not be accepted after the time I take it up on Tuesday.
- You must turn in your work. All of it. I know some of you don’t like it. I’m sorry. Do it anyways. If you don’t, the problem’s wrong. The whole, entire, beautiful problem is wrong. Sorry.
- The pencil is your friend and mine. Especially yours. I will not accept tests done in anything but pencil.

Write the following in radians. **Leave in terms of \( \pi \).**

1. \( 310^\circ \)
2. \( 160^\circ \)
3. \( 15^\circ \)

Write the following in degrees. **Write the exact value.**

4. \( \frac{3\pi}{5} \)
5. \( \frac{27\pi}{16} \)
6. \( \frac{7\pi}{12} \)

7. In a circle with a 24-cm radius, an arc length of 100 cm subtends a central angle of how many radians?

8. What is the arc length intersected by an angle of \( \frac{2\pi}{3} \) in a circle having a radius of 5 meters?

9. Through how many **degrees** does a minute hand of a clock move in 50 minutes?

Draw a picture that describes each of the following. Make sure to label everything specifically.

10. From the top of a 150-ft lighthouse on the water’s edge, the angle of depression to a boat is \( 12^\circ \).

11. Joss, who is 6 feet tall, sees a UFO hovering over the Earth. The angle of elevation from the top of his head to the UFO is \( 40^\circ \). The distance from where Joss is standing to the point over which the UFO is hovering is 200 feet.

12. A 47-foot guy wire is attached to a 30-foot telephone pole and secured to the ground level to the pole. At a point 60 feet from the base of the pole and on the same side of the pole as the guy wire, the angle of elevation to the top of the pole is \( 26.6^\circ \).
Find the angle between 0° and 360° that is coterminal with the given angle.

13. 834°
14. –2497°
15. 700°

Find a positive and a negative angle coterminal with the given angle.

16. 214°
17. 65°
18. 345°

Solve the following problems.

19. A building casts a shadow 300 ft long what the angle of elevation to the top of the building from the shadow is 26°. Find the height of the building.

20. From fire lookout tower A, a small forest fire is sighted due south. From a second tower B, which is located 4 miles due east of tower A, the bearing of the fire is S30°W. How far is the fire from tower B?

21. At an altitude of 2500 ft, the engine of a small airplane suddenly fails. At what angle of depression does the airplane have to glide in order to reach an airport runway 3 miles away? (1 mile = 5280 feet)

22. Two cabins in a valley are viewed from the top of a 2000 ft cliff and are on level ground with each other and the base of the cliff. The angles of depression to the cabins are 31° 20’ and 48° 10’. How far apart are the cabins?