Name: _____

FO-4313/6313 Spatial Technologies in Natural Resource Management
First Hour Exam, 2004

Formulae:

$$RF = \frac{1}{S} = \frac{d}{D} = \frac{f}{(H-h)} \qquad \frac{\delta h}{(H-h)} = \frac{d}{r} \qquad \frac{\delta h}{(H-h)} = \frac{dp}{AP_b + dp}$$

1. Scale is defined as: _____

   _____ (5)

2. In the scale equation above, define, in your words, the following items:

   d is _____ (3)

   D is _____ (3)

   f is _____ (3)

   (H-h) is _____ (3)

3. The two primary characteristics of an RF are:

   a. _____ (4)

   b. _____ (4)

4. A 1,000 ft object measures 1.2 inches on an aerial image that was taken with a camera that had a focal length of 152.4 mm and the aircraft altitude was 6,000 ft (msl).

   The length of the 1,000 ft object would be _____ inches on an aerial image if it was located at 500 ft above mean sea level. (5)

5. Using the parallax bar (floating dot) instrument on a stereo pair where the flying height was 3,000 ft above average terrain elevation and the average distance between the PP and CPP was 3.15 inches, the following parallax measurements were obtained:

   Reading at top of object = 12.76 mm
   Reading at bottom of object = 10.00 mm

   The height of the object is _____ ft. (9)

6. Explain why clear water appears dark/black on black and white infrared (positive/print)

imagery:

_____

_____ (4)

7. The 8 object attributes for interpretation are: (8)

4 S's: _____ _____ _____ _____

2 T's: _____ _____

7, 8: _____ _____

8. After printing a draft of your GIS map using ARC/View, you see that the scale bar is not a standard scale bar with 1 inch graduations and you wish to compute a Representative Fraction for the graphic scale bar. If one graduation on the scale bar is 67.5/60 inches in length and this graduation is labeled as 1,125 feet on the ground, the computed RF is 1:_____ (5)

9. If an object located at 500 ft elevation measures 0.27 inches in length on an aerial photograph taken with a 152.4mm focal length and the same object is 495 ft in length on the ground:

a. The RF scale of the photo at 500 ft is: _____ (5)

b. If the aircraft maintained the same altitude, the RF scale of the photo at m.s.l. (mean sea level) would be 1:_____ (4)

c. If the same object (0.27 in.), was located at m.s.l., it would have a **ground length** of _____ ft. (4)

10. On a single aerial image, a radial line is selected that passes over a coastal redwood tree whose base is located at 850 feet of elevation. What is the height of the tree if the photo scale is 1 inch equals 500 feet at the tree base elevation, the camera focal length is 6 inches, and the 60 scale on the engineer's scale is used to obtain the following measurements parallax measurements?

Nadir to base of tree = 241 increments
Nadir to top of tree = 255 increments

Height of tree = _____ ft. (10)

11. Your boss wants you to contract for new imagery that will allow him to see and measure wood duck boxes that are 10 x 12 inches in size. From your Spatial Technologies course you recall that the human eye can detect and measure objects that are 0.005 inches in size. Note the rectangular size; which side is the limiting size?

A. The smallest scale allowed for the project will be_____. (4)

B If the focal length of the aircraft camera is 203.2 mm and the average terrain elevation is 800 ft (m.s.l.), the aircraft altitude required to achieve the desired scale will be _____. (4)

12. You have a photograph with an average RF scale of 1/18,000 that was taken with a 152.4mm focal length camera at an average elevation of 1,000 feet.

If Stand A is located at 1250 ft elevation and contains 5,745 trees per square inch;

a. the RF scale of the photograph **at 1250** ft elevation is _____ (5)

b. the area scale at the 1250 ft elevation is 1 square inch = _____ acres (4)

c. the stand density in terms of trees per acre for stand A is _____ (4)