Name: Key

FO-4313/6313

First Hour Exam, 2009

Formulae:

(1) $RF = \frac{1}{S} = \frac{d}{D} = \frac{f}{(H-h)}$ **(2)** $\frac{\delta h}{(H-h)} = \frac{d}{r}$ (3) $\frac{\delta h}{(H-h)} = \frac{dp}{AP_b + dp}$

$dp = |X - X'|$ $AP_b = |Z - Z'|$

1. Scale is defined as: the ratio of image distance to ground distance (10)

   The two primary characteristics of an RF are:

   a. uniform (5)

   b. 1 in numerator (5)

2. Rayleigh scattering of the visible spectrum wavelengths results in haze (5)

   The human eye is the most sensitive to green wavelengths of the visible spectrum. (5)

3. If the RF scale is 1:6,000 and the human eye can detect an image that is 0.01 inches in length;
   the object size on the ground would be: 60' - 5 ft. ft in size. $\frac{1}{6000} = \frac{.01}{D}$ (5)

4. If the image distance on an aerial photograph is 175/60 inches and the ground distance is 262.5/60 inches on a 1:24,000 quad sheet,

   $\frac{1}{?} = \frac{175/60 \text{ in}}{(262.5/60)(24000)} = \frac{0.2917 \text{ in}}{6300 \text{ in}}$

   the calculated RF is : 1:36000 (5)

5. Explain why clear water appears dark/black on black and white infrared (positive/print) imagery:
   water absorbs IR so negative is clear, positive is black (5)

6. Your boss wants to know the smallest possible scale for some new aerial photography in order for gopher tortoise burrow openings or surrounding dirt apron of size approximately 3 ft to be seen on an image where the human eye can detect objects that at 0.024 inches in size with minimal magnification: -

   the minimum calculated RF is : 1:1500 $\frac{1}{?} = \frac{.024 \text{ in}}{3}$ (10)

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7. What are the differences/similarities between **d** in formula (2) and **dp** in formula (3)?

Differences: d = radial displace length of object
dp = X-distance of displaced length (5)

Similarities: Both are displaced object lengths (5)

8. On a single photograph taken at a platform altitude of 3,000 ft, the displace image of a tower is 80/60 inches in length and the ~~top~~ base of the tower image is located ~~200~~ 120/60 inches from the principal point.

The height of the tower is calculated to be: 1200 ft (5)

$\frac{\Delta h}{3000} = \frac{80}{120+60}$

9. You have a photograph with an average RF scale of 1/12,000 that was taken with a 152.4mm focal length camera at an average elevation of 1,000 feet. (Hint: What is H?)

$\frac{1}{12,000} = \frac{152.4/25.4/12}{H-1000}$ $\frac{1}{12,000} = \frac{.5}{H-1000}$ $H = 7000$ ft

If Stand A is located at 1250 ft elevation and contains 3,690 trees per square inch;

$\frac{1}{5} = \frac{.5'}{7000-1250}$ $\frac{1}{5} = \frac{1}{11,500}$

a. the area scale at the 1250 ft elevation is 1 square inch = 21.08 acres (5)

$1'' = 11,500'' = \frac{(958.332\ ft)^2}{43,560}$

b. the stand density in terms of trees per acre for stand A is 175 TPA (5)

$TPA = \frac{3690\ tpi}{21.08\ a}$

10. If, the desired scale of a photo mission is 1:12,000 for a 10 by 10 inch format size with specifications of 60% stereoscopic overlap, 25% sidelap, and 30% overhang allowance:

a. The format size in ground distance units would be: 10,000 ft by 10,000 ft (4)
1" = 1,000 ft

b. The acreage covered by one photo is 2,295.68 acres. (4)

c. In order to obtain 60% **endlap**, the distance between photo centers (on each flight line) should be 4,000 ft. $(1-.6)10,000 = 4,000$ (4)

d. In order to obtain a 30% photo (safety) **overhang** outside the target area boundary, the first and last flight lines should be located 2,000 ft. inside the area boundary. (4)

$(.5-.3)(9,000) = 2,000$

e. In order to obtain a 25% **sidelap**, interior flight lines (except for first and last) should be spaced a maximum of 7,500 ft. apart. (4)

$(1-.25)(9,000) = 7,500$

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