1.) A.) 1km = 47.6 m; 100m = 33.33m; 10m=8.33 m; 1m = .98 m; 0.1m = .099m
B.) N=2, D=25; N=4, D=12.5; N=8, D=6.25; N=16, D=3.125; N=22, D=2.27
C.) f stop 4 only collects 35% of the light that f stop 1.4 does

2.)

a.)

heright of focal plane = 3 cm

AOV of

400mm = .075 rad = 4.29 deg

100mm = .03 rad = 17.06 deg

50mm = .58 rad = 33.39 deg

30mm = .92 rad = 53.1 deg

b.)

according to the notes the fov is just r times the aov

400mm = .749 rad

100mm = .2978 rad

50mm = 5.829 rad

30mm = 9.272 rad

3. taken from 9 feet away

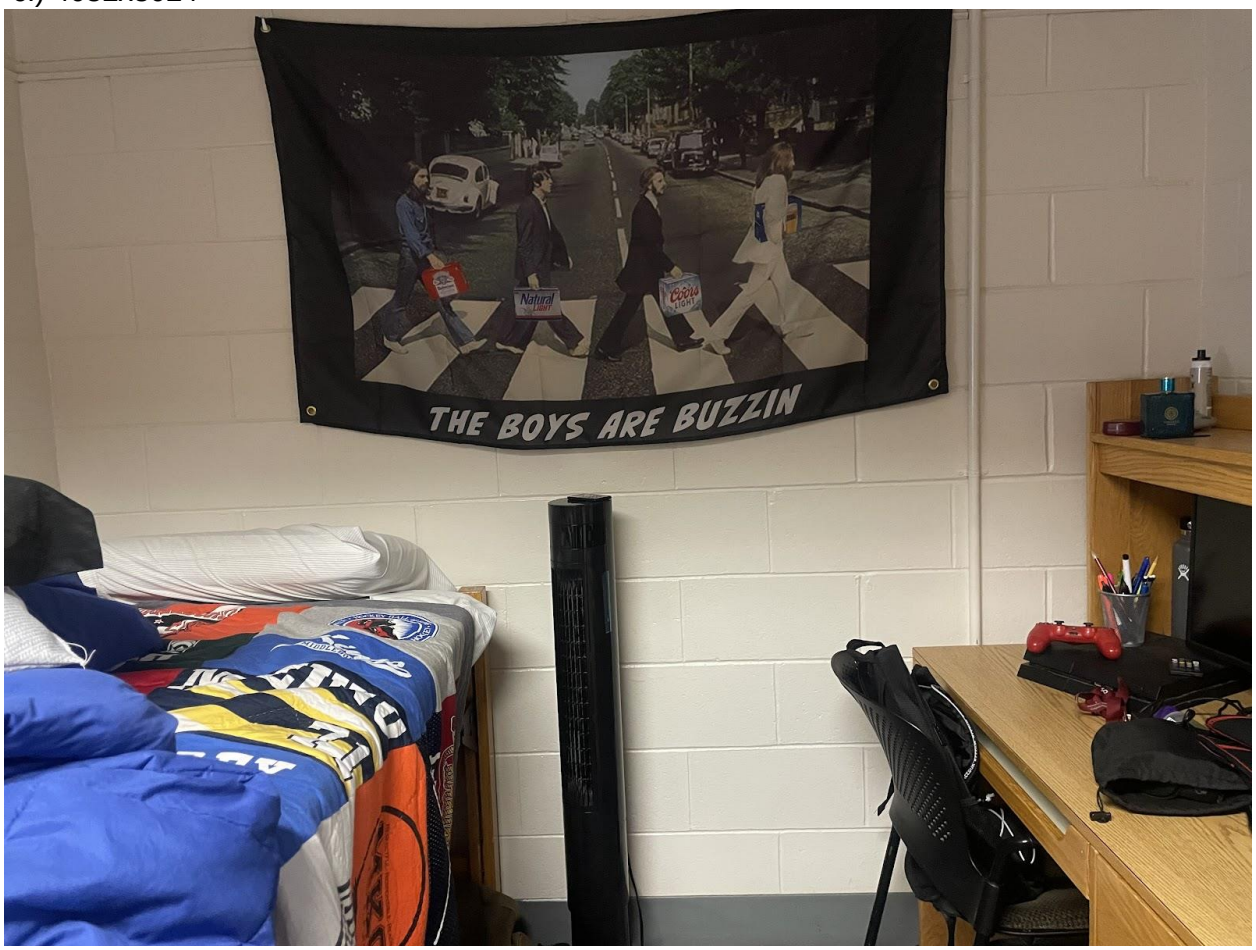
26mm

a.) vertical fov 2.53m

horizontal fov 3.97m

b.) AOV = .009

c.) 4032x3024



4.)

a.) 6270 x 4480 = 28,089,600 pixels = 28 megapixel

b.) 14 million pixels for green

7 million for red

7 million for blue

5.)

a.) 40 f = 4.44 c

at 4.44c there is about 4.5 electrons per pixel of noise in 1 second

0 f = -17.77 c

At -17.77c there is about .5 electrons per pixel of noise in 1 second

b.) expensive cameras don’t cool down their sensors because in the grand scheme of things, 5 electrons of noise is nothing compared to the thousands in a regular picture. It doesn't affect the end image much.

6.)

a.) for red light, in 1 watt over 1 second, 3.52*10^18 photons are present

for blue light, in 1 watt over 1 second, 2.26*10^18 photons are present

for ultraviolet light, in 1 watt over 1 second, 1.51*10^18 photons are present