2.3

ActualHeight/Distance=FocalHeight. Distance*FocalHeight=ActualHeight. Distance=200mm, FocalHeight=1.5mm, ActualHeight=300mm.

2.4

The transition from scotopic to photopic takes time.

2.5

SpeedOfLight/Frequency=Wavelength. SpeedOfLight=299792458m/s, Frequency=60Hz, Wavelength=4996.5km

2.7

A) 2048*2048px -> 50*50mm. 1024/50=20.5LP/mm

B) 2048*2048px -> 2*2in. 2048/2=1028dpi

2.8

1024*1024px -> 7*7mm. d=500mm, l=35mm.?

2.10

Have a light sensor pointed toward a painted part of the car. For every car that passes the sensor's field of view slide red, green, and blue filters over the lens. If light hits the sensor after passing through a red filter, then the car must be red. A white light will pass through all the filters because it contains all three colors.

2.11

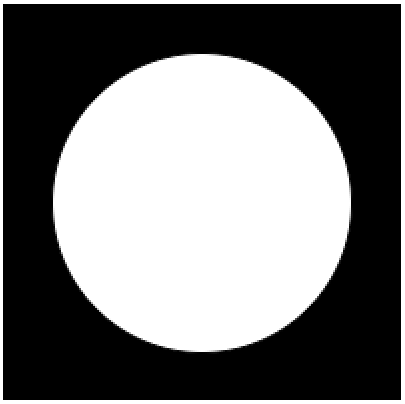
A) 500*10*1024*1024=5242880000bits. 3000000bits/s. 5242880000/3000000=1747.6s

B) 500*10*1024*1024=5242880000bits. 30000000000bits/s. 5242880000/30000000000=0.17476s

2.14

64 intensity levels

2.15



2.16

b) 8-adjacent

2.24

Given two arbitrary constants, *a* and *b*, and two arbitrary images $f_1(x,y)$ and $f_2(x,y)$, $\mathcal{H}$ is said to be a *linear operator* if

$$\begin{aligned}\mathcal{H}[af_1(x,y)+bf_2(x,y)] &= a\mathcal{H}[f_1(x,y)]+b\mathcal{H}[f_2(x,y)] \\ &= ag_1(x,y)+bg_2(x,y)\end{aligned} \tag{2-23}$$

$$g(x,y)=\frac{1}{mn}\sum_{(r,c)\in S_{xy}} f(r,c) \tag{2-43}$$

?

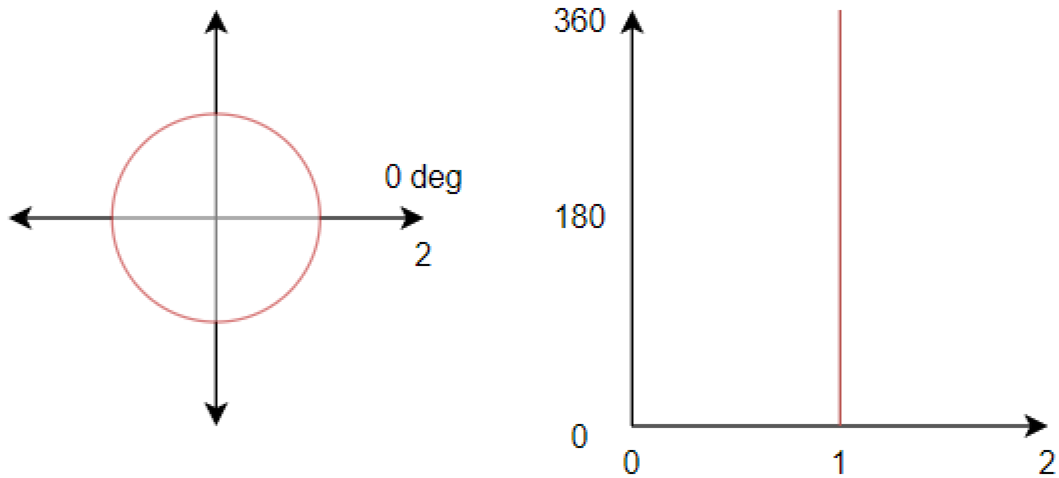
2.26

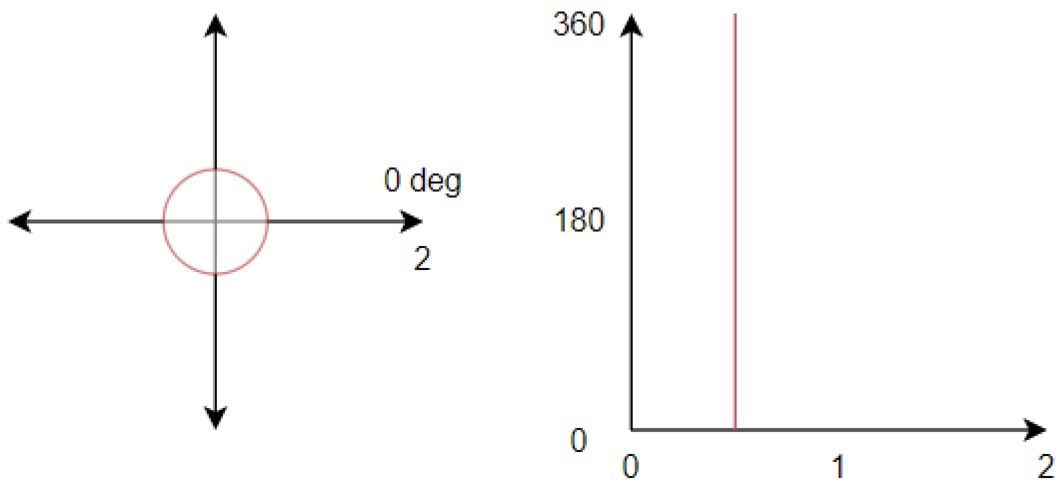
?

2.59

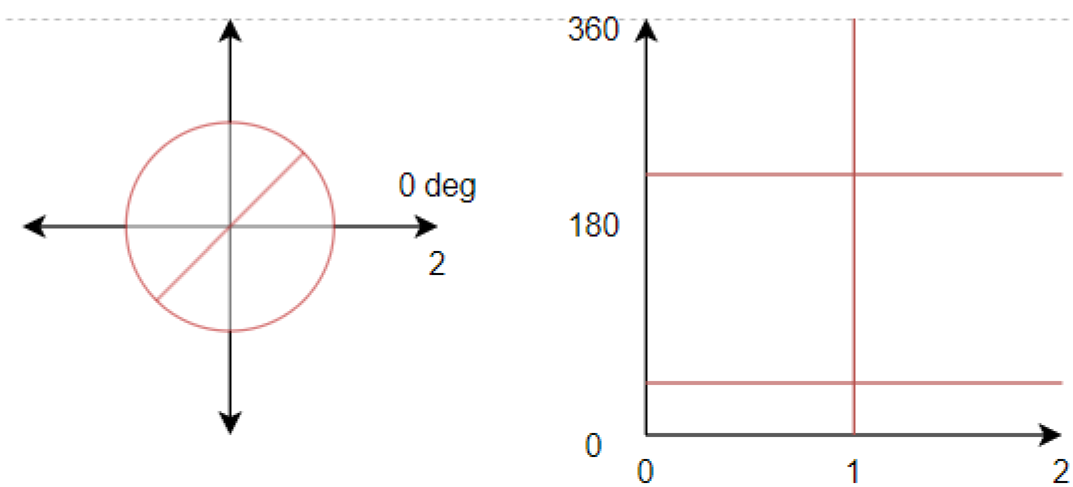
80*80mm, 2*2px?

1.

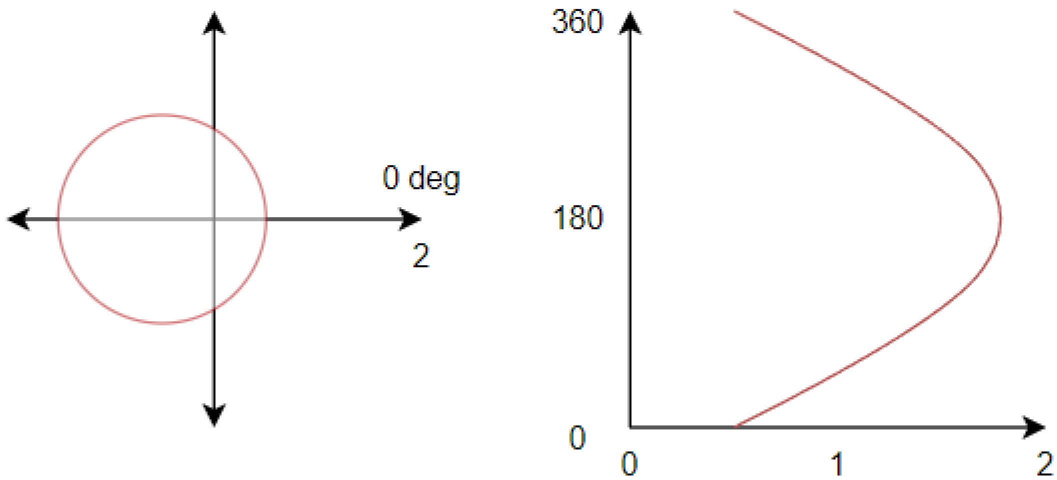


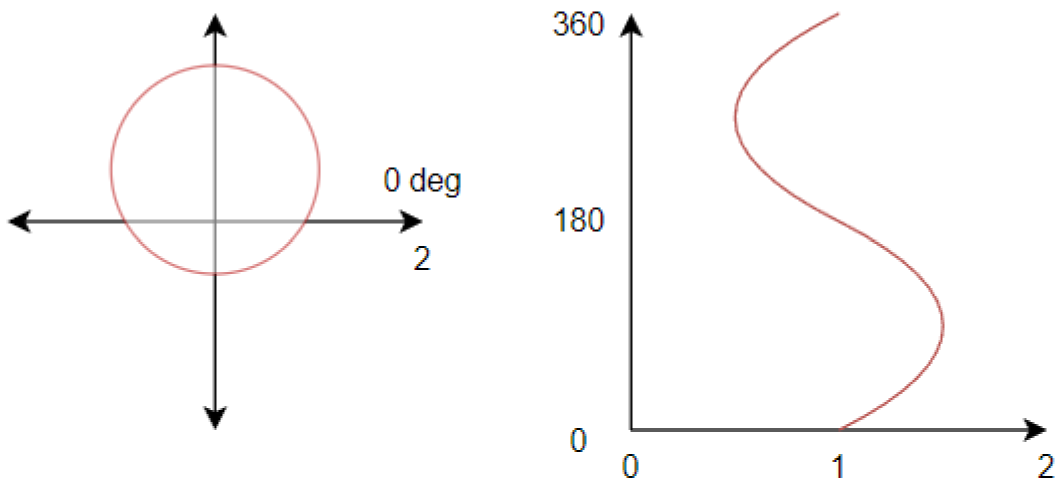


2.

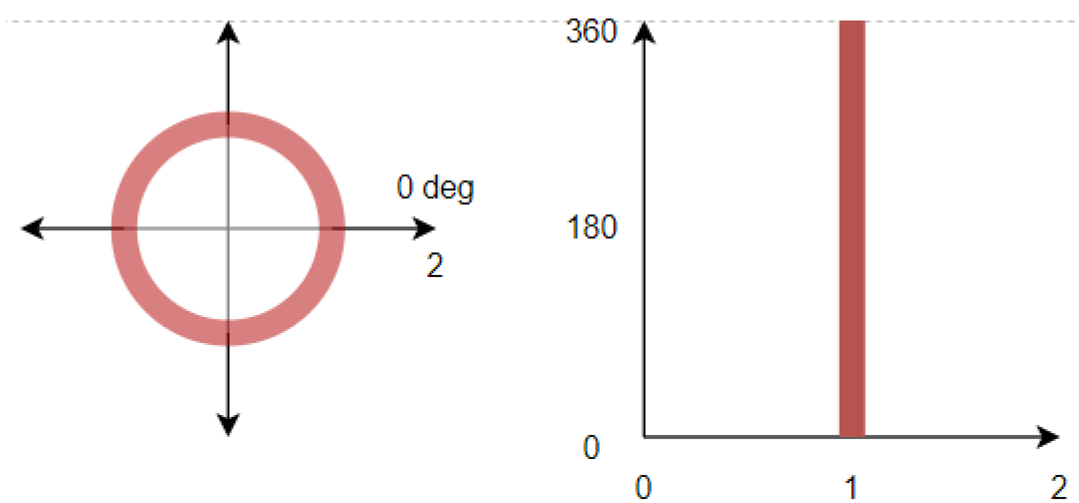


3.

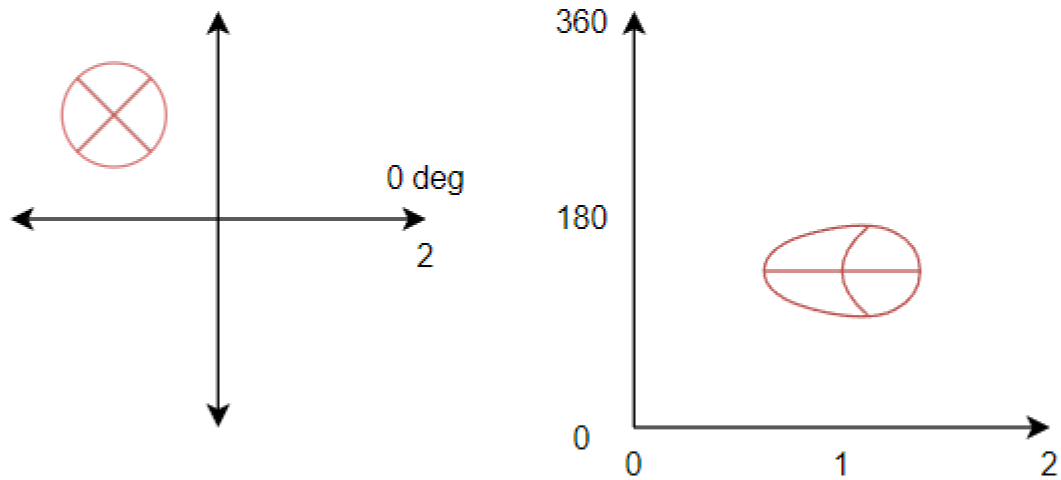




4.



5.



Targeting an object will start with it outside of the origin. To track the object, it must be at the origin. To determine if the object is at the origin the only shape in log-polar space would be a vertical line.

6.

The transformed annulus resembles either a sine or cosine wave depending on the orientation of the center of the annulus with respect to the origin. If the zero-degree angle is either closest to the edge of the annulus or further when compared with 90, 180, and 270 degrees, it will resemble a cosine wave. As the annulus moves closer to the origin the wave will seemingly lose amplitude and eventually become a straight line when it is perfectly centered. An annulus far off the origin will resemble an egg shape pointed towards the origin.