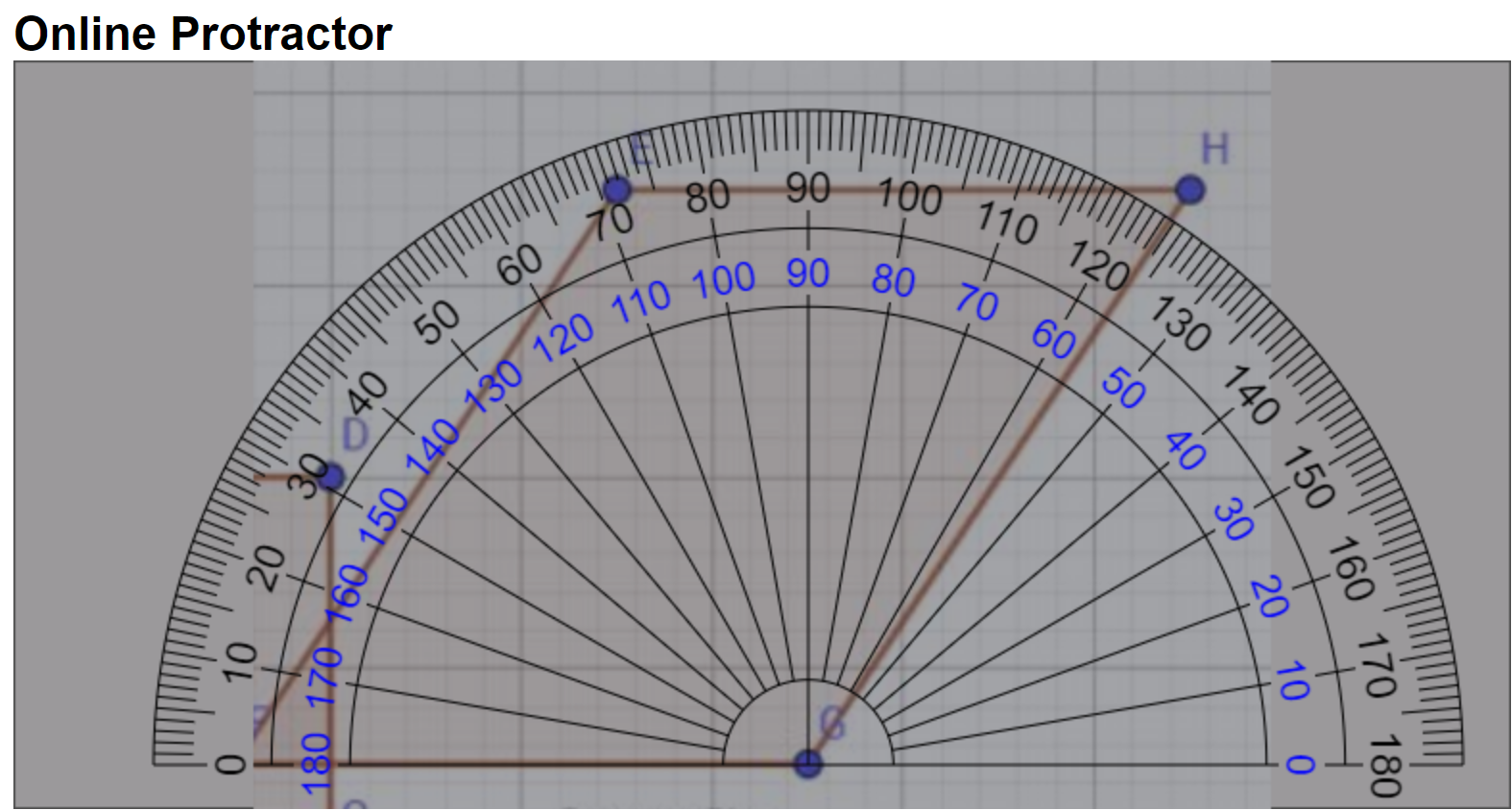
# Written Section:

### 1.



Measuring the sheared angle of the image I’ by online protractor, I find out the angle is roughly from 56.0 to 56.5 degree. So I select 56.3 degree as the sheared angle. Then the shear factor is equal to cot(56.3) (cotangent of 56.3 degree), which is roughly equal to 2/3.

Thus, the shear transformation matrix is

It is also easy to find out that both the width and height of the original image was scaled by 1.5, so the scale transformation matrix is

Finally, we find out the image I’ has moved in 1.5 in x-axis and 0.5 in y-axis, so the translation matrix is

Composing the three transformation matrices, we get:

= corresponds to

Hence, we conclude:

=

### 2.

Transforming J from Image I’ back to Image I, use the inverse of the above transformation matrix.

The original J in the Image I is:

The bilinear interpolation formula is g(x,y) = ax + by + cxy + d:

Plug M (1,1):

30=a+b+c+d

Plug L (2,1):

18=2a+b+2c+d

Plug K (2,2):

10=2a+2b+4c+d

Plug I (1,2):

4=a+2b+2c+d

Solve the above equation:

We get:

A=-30

B=-44

C=18

D=86

Finally, calculate the intensity of J as:

G(x,y) = a+b+c+d=