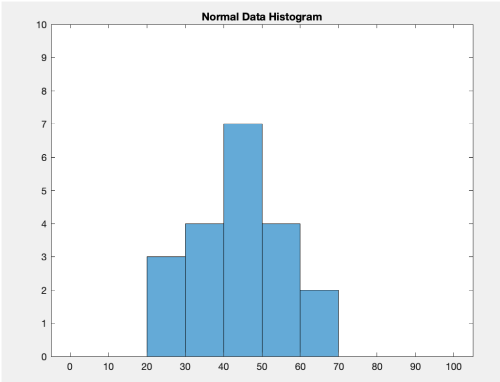
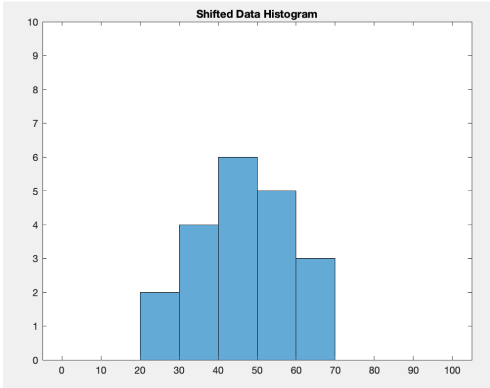
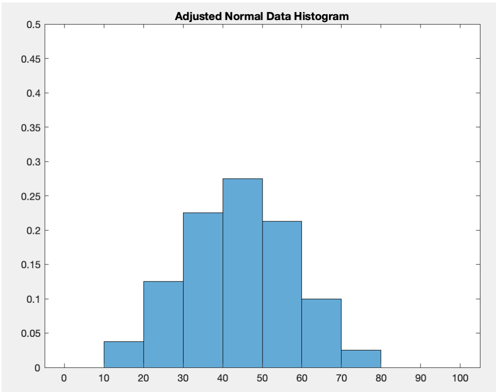
Histogram Lab

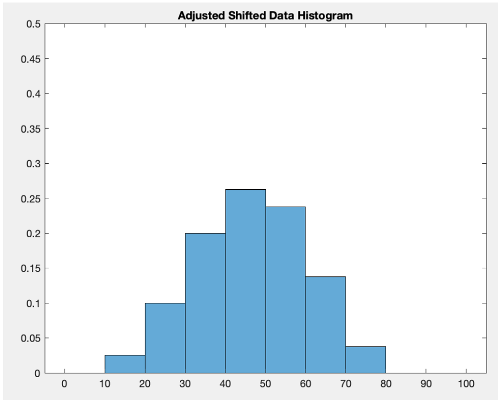
1. Screenshot of original histogram (normal and shifted)





2. Screenshot of adjusted histogram (normal and shifted)

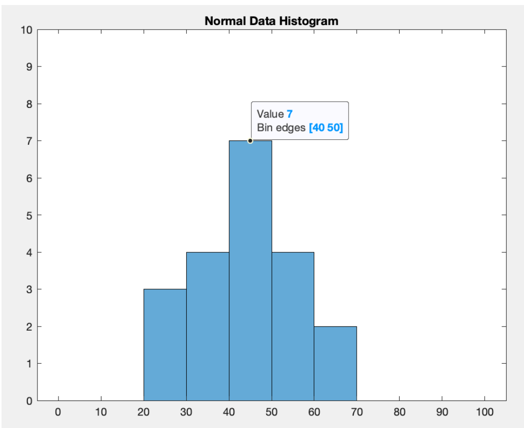


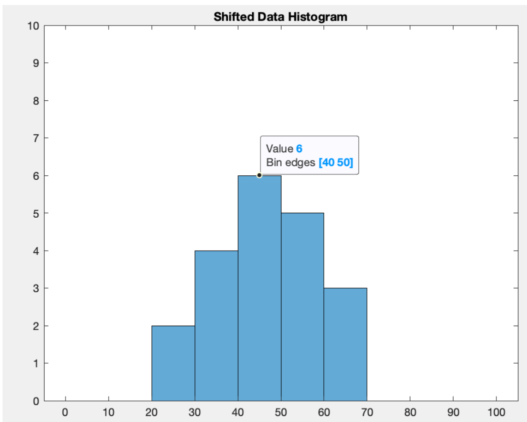


3. Distance Calculation (original)

KLD = $\sqrt{(-1)^2 + (-1)^2 + 1^2 + 1^2}$ = $\sqrt{4}$ = 2

EMD = (60-50) x 1 + (70-30) x 1 = 50





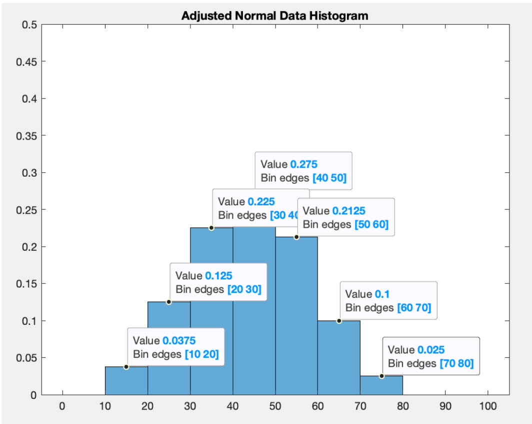
4. Distance Calculation (shifted)

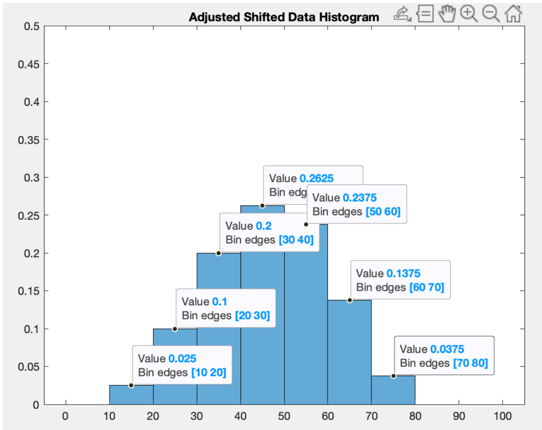
KLD =

$\sqrt{(0.0125)^2 + (0.025)^2 + (0.025)^2 + (0.0125)^2 + (0.025)^2 + (0.0375)^2 + (0.0125)^2}$

= 0.00375

EMD (possible) = 0.025 x (60-40) + 0.125 x (70-50) + 0.0125 x (70-30) + 0.0125 x (80-20) = 0.5 + 0.25 + 0.5 + 0.75 = 2





5. What makes the difference?
   The histogram adjustment method aims to reduce the disparity between normal data and shifted data by minimizing their distance.

6. Why does histogram adjustment work?
   Histogram adjustment works because it helps make the shifted data look more like the normal data. It does this by making the shifted values closer to the normal ones and by rearranging how the data is grouped into bins, which can make the differences between them smaller.

```
%shifted data
shiftedData = normalData + 2;
```

```
function [outputHistogram] = adjustHistogram(inputHistogram)
    temp = inputHistogram.Values;
    value1 = temp;
    uptemp = temp(2:end)./2;
    downtemp = temp(1:(end-1))./2;
    temp(1:(end-1)) = temp(1:(end-1)) + uptemp;
    temp(2:end) = temp(2:end) + downtemp;
    outputHistogram = temp./sum(temp);
end
```