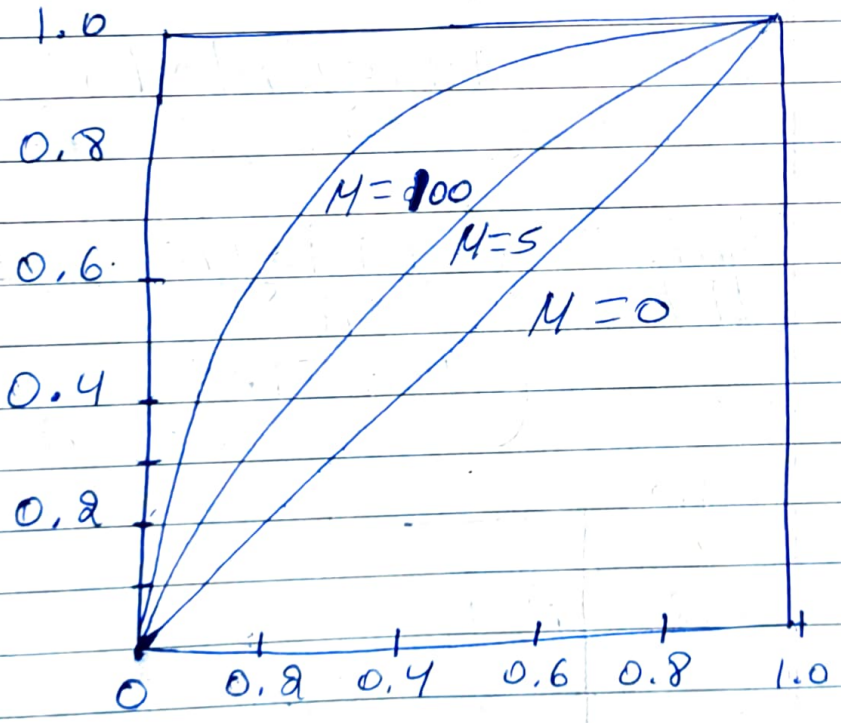
Companding

1) μ Law :-

$$|v| = \frac{\log(1+\mu|m|)}{\log(1+\mu)}$$

m and v are the normalised input and output voltages.



Step size is defined by the reciprocal of slope of the compression curve given by

$$\frac{d|m|}{d|v|} = \frac{\log(1+\mu)(1+\mu|m|)}{\mu}$$

It is approx linear at low input levels corresponding to $\mu|m| << 1$ and logarithmic at high input levels corresponding to $\mu|m| >> 1$.

2) A-Law:-

$$|v| = \begin{cases} \frac{A|m|}{1+\log A} & 0 \le |m| \le \frac{1}{A} \\ \frac{1+\log(A|m|)}{1+\log A} & \frac{1}{A} \le |m| \le 1 \end{cases}$$

$$\frac{d|v|}{d|m|} = \begin{cases} \frac{1+\log A}{A} & 0 \le |m| \le \frac{1}{A} \\ (1+A)|m| & \frac{1}{A} \le |m| \le 1 \end{cases}$$