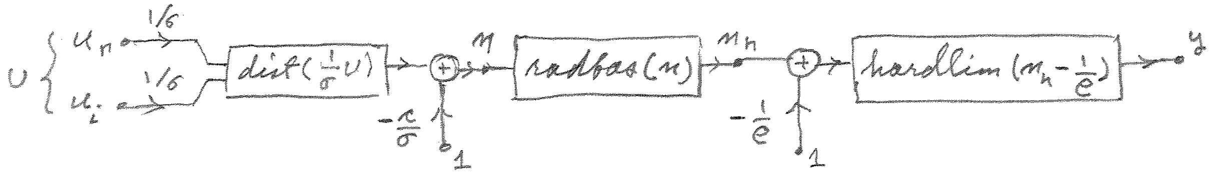
#2. a) $R(0,\sigma,\sigma) = e^{-((0-\sigma)^2/\sigma^2)} = e^{-1} = 1/e$

b)



c) We have, $1(\cdot)$ = unit step

$$y = 1(n_h - 1/e) = 1\left(e^{-(dist(\frac{1}{\sigma}U) - \frac{c}{\sigma})^2} - \frac{1}{e}\right)$$

$$= 1\left(e^{-\left(\frac{\sqrt{u_n^2+u_i^2}}{\sigma} - \frac{c}{\sigma}\right)^2} - \frac{1}{e}\right)$$

$$= 1\left(e^{-((|u|-c)/\sigma)^2} - \frac{1}{e}\right)$$

We want the maximum of the argument of $1(\cdot)$ at $|u| = 1$ which means

$$\underline{\underline{c = 1}}$$

Thus

$$y = \begin{cases} 0 & \text{if } e^{-(|u|-1)^2/\sigma^2} - 1/e < 0 \\ 1 & \text{if } e^{-(|u|-1)^2/\sigma^2} - 1/e > 0 \end{cases}$$

∴ we wish the jump point at

$$e^{-(|u|-1)^2/\sigma^2} = 1/e$$

which is the same as

$$(|u|-1)^2/\sigma^2 = 1 \Rightarrow \sigma = \pm(|u|-1)\Big|_{\text{at } |u| = 0.98 \,\&\, 1.02}$$

i.e. $\sigma = 1.02 - 1 = 0.02$

$\& = 1 - 0.98 = 0.02$

∴ $\underline{\underline{\sigma = 0.02}}$

d) For x outside $0.98 \le x \le 1.02$ the hardlimit gives 0 and for all points inside it gives 1 so the network always gives the correct result