

In MATLAB, there is no Q function implemented. You can create the following .m file.

```
function y = q_ece(x)
y=0.5*erfc(x/sqrt(2));
```

Ex: X is a Gaussian with $\mu=1$,
 $\sigma^2=4$.

$Y=2X+1$. Find the prob

$$P(1 \leq Y \leq 2 \text{ or } 3 \leq Y \leq 4)$$

Ans:

= Summary

* For any R.V. X . & $Y = aX + b$.

$\mu_Y = a\mu_X + b, \text{ Var}(Y) = a^2 \text{Var}(X)$

* Gaussian R.V + linear transformation

Two important conclusions.

① If X is a Gsn with μ_X, σ_X^2 and $Y = aX + b$, then Y is also a

Gsn with $\begin{matrix} \mu_Y \\ \sigma_Y^2 \end{matrix}$

② If X is a Gsn with μ_X, σ_X^2

then X can be viewed as generated by \square where

Z is a mean 0, variance 1 Gsn R.V, called the standard Gsn.

③ Computing the prob of Z is achieved by table look-up.

So far, we assume that we know the W.A. completely (say pdf/pmf/cdf/charact...
moment generating / prob

But in many cases we only know part of the W.A. Can we still do some meaningful implication?

Probability Bounds:

①

If we know $\textcircled{1} P(0 < X < 3)$ and $\textcircled{2} P(1 < X < 5)$

Q: what is the estimate of

$P(0 < X < 3)$ or $P(1 < X < 5)$

Ans:

②