$$\Gamma\alpha = \int_0^\infty e^{-x} x^{\alpha-1}\, dx$$

3 vehicle
80 minutes

$$\Gamma\alpha = (\alpha-1)\,\Gamma(\alpha-1)$$
$$= (\alpha-1)(\alpha-2)\,\Gamma(\alpha-2)$$
$$= (\alpha-1)(\alpha-2)\cdots 3.2.1$$
$$= (\alpha-1)(\alpha-2)\cdots$$
$$= (\alpha-1)!$$

$\alpha = 3$

$x = 80$

$$\boxed{\Gamma 1 = 1}$$

$$f(x) = \frac{1}{\Gamma\alpha\, \theta^\alpha}\, x^{\alpha-1} e^{-x/\theta}\ ; \quad 0 \le x < \infty$$

$$\int_0^\infty f(x)\,dx = \int_0^\infty \frac{1}{\Gamma\alpha\, \theta^\alpha}\, e^{-x/\theta} x^{\alpha-1}\, dx$$
$$= \frac{1}{\Gamma\alpha}\int_0^\infty e^{-x/\theta} \left(\frac{x}{\theta}\right)^{\alpha-1} \frac{dx}{\theta}$$
$$= \frac{1}{\Gamma\alpha}\int_0^\infty e^{-y} y^{\alpha-1}\, dy$$
$$= \frac{1}{\Gamma\alpha}\,\Gamma\alpha = 1$$

$x/\theta = y$

$\frac{dx}{\theta} = dy$

$x \to 0, \infty$

$y \to 0, \infty$

$\alpha = 1 \quad f(x) = \frac{1}{\theta} e^{-x/\theta}$

$$M(t) = \int_0^\infty e^{tx} \frac{1}{\Gamma\alpha\ \theta^\alpha} x^{\alpha-1} e^{-x/\theta}\, dx$$

$$= \frac{1}{(1-\theta t)^\alpha}$$

$$\underline{\alpha=1} \quad M(t) = \frac{1}{1-\theta t}$$

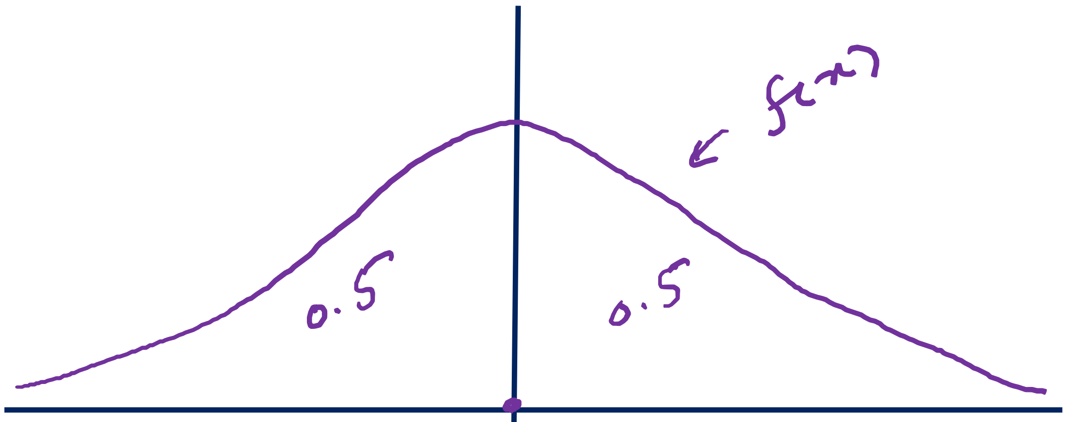
$$\mu = M'(0) = \alpha\theta \longrightarrow \theta$$

$$\sigma^2 = M''(0) - \{M'(0)\}^2 = \alpha\theta^2 \longrightarrow \theta^2$$

$$P(X \geq x_0) = P(X > x_0) = \int_{x_0}^{\infty} f(x)\, dx$$

$$P(X < x_0) = P(X \leq x_0) = \int_0^{x_0} f(x)\, dx$$

$$= 1 - P(X < x_0)$$



Mean = Median = Mode

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \; ; \; 0 < x < \infty$$

Mean = μ

variance = σ^2

$$\int_{-\infty}^{\infty} f(x)\,dx = 1$$

$$M(t) = e^{\mu t + \frac{1}{2}\sigma^2 t^2}$$

$$M(0) = e^{0} = 1$$

$N(\mu, \sigma^2)$

$N(\underline{36}, \underline{25})$

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

standard variable $z = \frac{x-\mu}{\sigma}$

$\mu_z = 0$

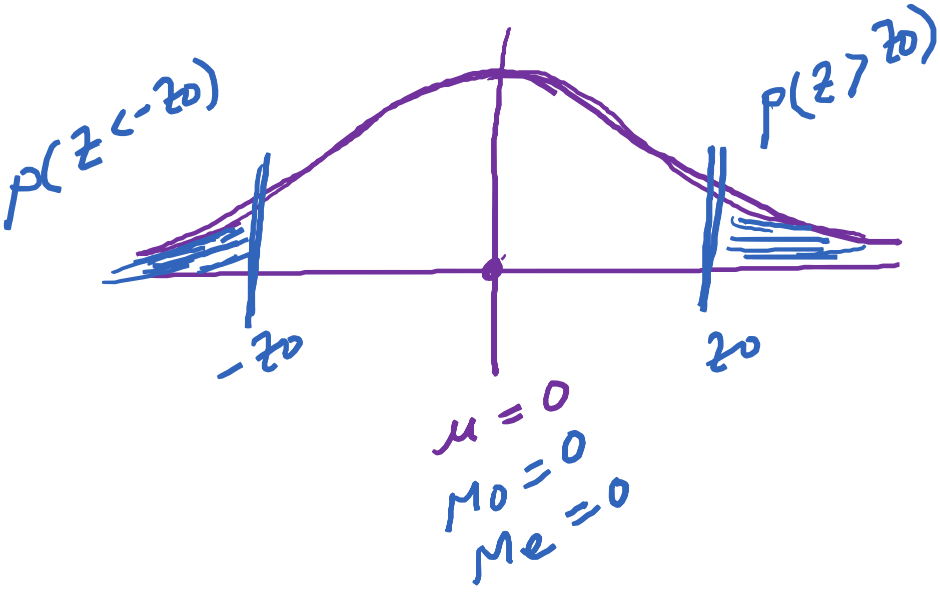
$\sigma^2_z = 1$

Statistical index $N(0,1)$

$$f(z) = \frac{1}{\sqrt{2\pi}} e^{-z^2/2}$$

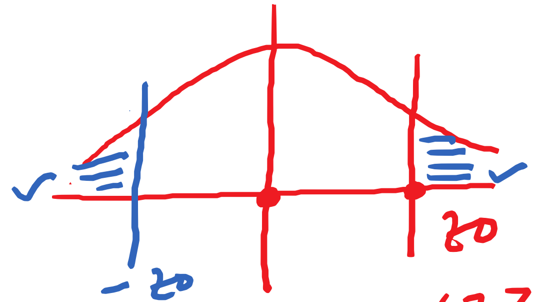
$$F(z) = P(Z \le z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z} e^{-w^2/2}\, dw$$

$\rightarrow$ Normal Table



$Z \rightarrow \mu_z = 0$

$P(Z < -z_0) = P(Z > z_0)$

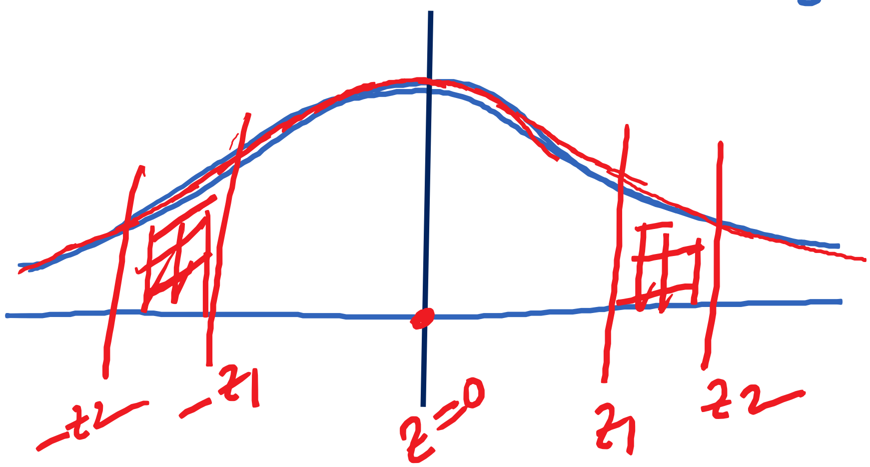


$P(Z \geq z_0)$

$= 1 - P(Z < z_0)$

$= \boxed{1 - \Phi(z_0)}$

$= P(Z \leq -z_0)$



$$P(-z_2 \leq Z \leq -z_1) = P(z_1 \leq Z \leq z_2)$$

$\#$ $P(-z_2 \leq Z \leq z_1)$

$= P(Z \leq z_1) - P(Z \leq -z_2)$

$= \Phi(z_1) - [1 - \Phi(z_2)]$

$\#$ $P(|Z| \leq z_0)$

$= P(-z_0 \leq Z \leq z_0)$

$= P(Z \leq z_0) - P(Z \leq -z_0)$

$= \Phi(z_0) - [1 - \Phi(z_0)]$

$= 2\Phi(z_0) - 1$

$$
\begin{aligned}
\# \; P(|Z| > z_0) &= P(Z \geq z_0) + P(Z \leq -z_0) \\
&= 1 - \varphi(z_0) + 1 - \varphi(z_0) \\
&= 2 - 2\varphi(z_0)
\end{aligned}
$$