

Mathematical Statistics 1 - Lecture Notes

Philip Warton

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Let $X \sim N(\mu, \sigma^2)$. We know that we can write $x = \sigma z + \mu$ where “=” means equality in distribution. Therefore, if we can compute $M_z(t)$, then applying the result that $M_{ax+b}(t) = e^{tb} M_X(at)$ we get the moment-generating function for X . So, let $Z \sim N(0, 1)$.

$$M_Z(t) = \int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi}} e^{tz}$$