M1S : EXERCISES & SOLUTIONS : ERRATA

EXERCISES 5: Q6. Final part: pmf should have $p = 0.5$ in formula for negative binomial, that is $X \sim NegBinomial(3, 1/2)$, and

$$f_X(x) = \binom{x-1}{n-1} \theta^n (1-\theta)^{x-n} = \binom{x-1}{2} (0.5)^3 \; (0.5)^{x-3} \qquad x = 3, 4, 5, ...$$

and zero otherwise.

EXERCISES 8: Q6. Part (iii): MGF/PGF for the Normal; small sign error in calculation; result as follows, given correctly on other material

Using the trick mentioned in Q3, we must have

$$\int_{-\infty}^{\infty} \exp\left\{-\lambda x^2/2\right\} \, dx = \left(\frac{2\pi}{\lambda}\right)^{1/2}$$

and hence

$$\begin{aligned}
M_X(t) &= \int_{-\infty}^{\infty} e^{tx} \left(\frac{\lambda}{2\pi}\right)^{1/2} \exp\left\{-\lambda x^2/2\right\} \, dx = \left(\frac{\lambda}{2\pi}\right)^{1/2} \int_{-\infty}^{\infty} \exp\left\{-\frac{1}{2}\left[\lambda x^2 - 2tx\right]\right\} \, dx \\
&= \left(\frac{\lambda}{2\pi}\right)^{1/2} \int_{-\infty}^{\infty} \exp\left\{\frac{\lambda}{2}\left[\left(x - \frac{t}{\lambda}\right)^2 - \left(\frac{t}{\lambda}\right)^2\right]\right\} \, dx \quad \text{(completing the square in } x\text{)} \\
&= \left(\frac{\lambda}{2\pi}\right)^{1/2} \exp\left\{\frac{\lambda}{2}\left(\frac{t}{\lambda}\right)^2\right\} \int_{-\infty}^{\infty} \exp\left\{-\frac{\lambda}{2}\left(x - \frac{t}{\lambda}\right)^2\right\} \, dx \\
&= \left(\frac{\lambda}{2\pi}\right)^{1/2} \exp\left\{\frac{t^2}{2\lambda}\right\} \int_{-\infty}^{\infty} \exp\left\{-\frac{\lambda}{2} y^2\right\} \, dy \quad \text{(changing variables to } y = x - t/\lambda\text{)} \\
&= \left(\frac{\lambda}{2\pi}\right)^{1/2} \exp\left\{\frac{t^2}{2\lambda}\right\} \left(\frac{2\pi}{\lambda}\right)^{1/2} = \exp\left\{\frac{t^2}{2\lambda}\right\}
\end{aligned}$$

(PLEASE LET ME KNOW IF YOU THINK YOU HAVE FOUND ANY OTHER ERRATA)