# STAT 437
# FORMULA SHEET

1. If $X$ is $N(\mu, \sigma^2)$ then $M_X(r) = E(e^{Xr}) = e^{\mu r + \sigma^2 r^2/2}$.

2. If $S = X_1 + X_2 + \cdots + X_N$, $X_i$ are i.i.d. and independent of $N$

$$\begin{aligned} \text{then} \quad M_s(t) &= M_N(\ln M_X(t)) \\ E(S) &= E(N)E(X) \\ \text{var}S &= (E(X))^2 \text{var}N + E(N)\text{var}X \end{aligned}$$

3. $M_{L_1}(r) = (M_X(r) - 1)/p_1 r$

4. $M_L(r) = \dfrac{\theta_{p_1 r}}{1 - M_X(r) + (1+\theta)p_1 r}$

5. $c = \lambda p_1(1+\theta)$

6. $\displaystyle\int_0^\infty e^{ur}\left[-\psi'(u)\right] du = \frac{\theta}{1+\theta} \frac{M_X(r) - 1}{(1 - M_X(r) + (1+\theta)p_1 r)}$

7. If $X$ is Gamma, where $f(x) = \beta^\alpha x^{\alpha-1} e^{-\beta x}/\Gamma(\alpha)$ then $M_x(r) = \left(\frac{\beta}{\beta - r}\right)^\alpha$, where $r < \beta$.

8. For the Compound Poisson model, the adjustment coefficient $R$ *is* given by

$$1 + (1+\theta)\, p_1 R = M_x(R), \qquad R > 0.$$

9. $f_S(x) = \frac{\lambda}{x} \sum j p(j) f_S(x - j)$