Final exam - formula sheet

The formula sheet on the final exam itself will be very similar to this one, but perhaps not identical.

Name of distribution	**Probability/density function**	$E(X)$	$V(X)$
Binomial	$\binom{n}{x}p^x(1-p)^{n-x}$	np	$np(1-p)$
Geometric	$p(1-p)^x$	q/p	q/p^2
Negative binomial	$\binom{x+r-1}{r-1}p^r(1-p)^x$	rq/p	rq/p^2
Poisson	$\frac{\lambda^x}{x!}e^{-\lambda}$	λ	λ
Hypergeometric	$\frac{\binom{k}{x}\binom{N-k}{n-x}}{\binom{N}{n}}$	$\frac{nk}{N}$	$n\left(\frac{k}{N}\right)\left(1-\frac{k}{N}\right)\left(\frac{N-n}{N-1}\right)$
Uniform	$\begin{cases}\frac{1}{b-a}, & a \le x \le b \\ 0, & \text{elsewhere}\end{cases}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exponential	$\frac{1}{\theta}e^{-x/\theta}$	θ	θ^2
Gamma	$\frac{1}{\Gamma(\alpha)\beta^\alpha}x^{\alpha-1}e^{-x/\beta}$	$\alpha\beta$	$\alpha\beta^2$
Normal	$\frac{1}{\sigma\sqrt{2\pi}}e^{-(x-\mu)^2/2\sigma^2}$	μ	σ^2

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

$$\Gamma(\alpha+1) = \alpha\Gamma(\alpha) \tag{2}$$

$$M_X(t) = E[e^{tX}] \tag{3}$$

$$P_X(t) = E[t^X] \tag{4}$$

$$\mu_{[k]} = E[X(X-1)(X-2)\cdots(X-k+1)] \tag{5}$$