TABLE 2.1. Simple exponential families with dispersion parameter

$$f(y|\theta,\phi,\omega) = \exp\left\{\frac{y\theta - b(\theta)}{\phi}\omega + c(y,\phi,\omega)\right\}$$

(a) Components of the exponential family

Distribution		$\theta(\mu)$	$b(\theta)$	ϕ
Normal	$N(\mu,\sigma^2)$	μ	$\theta^2/2$	σ^2
Bernoulli	$B(1,\pi)$	$\log(\pi/(1-\pi))$	$\log(1+\exp(\theta))$	1
Poisson	$P(\lambda)$	$\log\lambda$	$\exp(\theta)$	1
Gamma	$G(\mu,\nu)$	$-1/\mu$	$-\log(-\theta)$	ν^{-1}
Inverse Gaussian	$IG(\mu,\sigma^2)$	$1/\mu^2$	$-(-2\theta)^{1/2}$	σ^2

(b) Expectation and variance

Distribution	$E(y)=b'(\theta)$	var. fct. $b''(\theta)$	$\text{var}(y)=b''(\theta)\phi/\omega$
Normal	$\mu=\theta$	1	σ^2/ω
Bernoulli	$\pi=\frac{\exp(\theta)}{1+\exp(\theta)}$	$\pi(1-\pi)$	$\pi(1-\pi)/\omega$
Poisson	$\lambda=\exp(\theta)$	λ	λ/ω
Gamma	$\mu=-1/\theta$	μ^2	$\mu^2\nu^{-1}/\omega$
Inverse Gaussian	$\mu=(-2\theta)^{-1/2}$	μ^3	$\mu^3\sigma^2/\omega$