# Quick derivation for slide 11

Taylor series can be used, or you can observe that, on a graph of $f(Y)$ versus $Y$,

$$\text{slope} \approx \frac{\Delta f(Y)}{\Delta Y}$$
$$f'(\mu) \approx \frac{f(Y) - f(\mu)}{Y - \mu}$$
$$f(Y) \approx f(\mu) + (Y - \mu)\, f'(\mu)$$

$$\frac{1}{\mu} \propto \int \frac{d\mu}{\sqrt{V(\mu)}}$$

$$\int [V(\mu)]^{-1/2}\, d\mu \propto \mu^{-1}$$

$$[V(\mu)]^{-1/2} \propto \mu^{-2}$$

$$V(\mu)^{1/2} \propto \mu^{2}$$

$$V(\mu) \propto \mu^{4}$$

Takehome message: This is a *high* power of $\mu$, i.e. a radical departure from constancy.