$$\theta \mid y \sim N\left(\hat{\theta}, [I(\hat{\theta})]^{-1}\right)$$

$$(\theta - \hat{\theta}) \mid y \sim N\left(0, [I(\hat{\theta})]^{-1}\right)$$

Now consider $\boxed{z = [I(\hat{\theta})]^{1/2}(\theta - \hat{\theta})}$

If $X \sim N(\mu, \Sigma)$ and A is a linear transformation, then

$$AX \sim N(A\mu, A\Sigma A^T)$$

mean: $[I(\hat{\theta})]^{1/2} \cdot 0 = 0$

symmetric

variance: $[I(\hat{\theta})]^{1/2}\left([I(\hat{\theta})]^{-1}\right)\left([I(\hat{\theta})]^{1/2}\right)^{\cancel{T}} = I$

Hence $z \mid y \sim N(0, I)$

θ $\qquad y \sim N(\theta, 1)$ uniform prior

$H_0 : \theta = 0$

$H_A : \theta > 0$ $\qquad$ Data: $y = 1$

Frequentist approach	Bayesian approach
$z = \frac{1-0}{1} = 1$	$y=1$ likelihood $p(y \mid \theta)$
	prior $p(\theta)$
one-sided p-value of 0.16	$\vdots$
two-sided p-value of 0.32	Posterior probability that $\theta > 0$ is 84%
BOTH "fail to reject"	
p-value > 0.05 threshold	

) updating a belief with uncertainty quantified.