FIGURE 3.1 Calculating a *p*-value

The *p*-value is the probability of drawing a value of $\overline{Y}$ that differs from $\mu_{Y,0}$ by at least as much as $\overline{Y}^{act}$. In large samples, $\overline{Y}$ is distributed $N(\mu_{Y,0}, \sigma^2_{\overline{Y}})$ under the null hypothesis, so $(\overline{Y} - \mu_{Y,0})/\sigma_{\overline{Y}}$ is distributed $N(0,1)$. Thus the *p*-value is the shaded standard normal tail probability outside $\pm|(\overline{Y}^{act} - \mu_{Y,0})/\sigma_{\overline{Y}}|$.