Name:

Quiz 6, Attempt 1

For a random sample of size N = 11 from a $N(\mu, \sigma^2 = 7)$ distribution, derive a testing procedure to determine whether it is plausible that the population mean is 2. Use a two-sided alternative and a type 1 error rate of 13%.

Part 1: Complete the sentence. I will reject the null hypothesis if

$$\frac{\bar{X} - 2}{\sqrt{\frac{7}{11}}} \text{ is } > z_{0.935} \quad \text{or} \quad < z_{0.065}$$

Part 2: If the population mean is 3, what is the power of the test?

$$\pi(3) = P\left(\frac{\bar{X} - 2}{\sqrt{\frac{7}{11}}} > z_{0.935} \,\bigg|\, \mu = 3\right) + P\left(\frac{\bar{X} - 2}{\sqrt{\frac{7}{11}}} < z_{0.065} \,\bigg|\, \mu = 3\right)$$

$$= P\left(\frac{\bar{X} - 3}{\sqrt{\frac{7}{11}}} > z_{0.935} - \frac{1}{\sqrt{\frac{7}{11}}} \,\bigg|\, \mu = 3\right) + P\left(\frac{\bar{X} - 3}{\sqrt{\frac{7}{11}}} < z_{0.065} - \frac{1}{\sqrt{\frac{7}{11}}} \,\bigg|\, \mu = 3\right)$$

$$= 1 - \Phi\left(z_{0.935} - \frac{1}{\sqrt{\frac{7}{11}}}\right) + \Phi\left(z_{0.065} - \frac{1}{\sqrt{\frac{7}{11}}}\right).$$