Here are some screen shots showing several different uses of the program G*Power.

In class, we first considered a situation in which we were using a Z statistic to test the null hypothesis $\mu = 30$. Our belief was that $\mu$ is really equal to 35. We assume that $\sigma = 10$. Initially, our sample size is 25. Here we see the results. Notice that we used the box to the right to calculate the effect size from our assumed true mean. The power ($0.669708, \approx 0.67$) exactly matches our calculation in class using R.
Next, we do an analysis to examine how large our sample size would need to be in order to have power $= .90$ (making the same assumptions as before). Here’s the result:

![G*Power 3.0.10](image)

The answer is that we would need a sample of 44.
Now we give up our assumption that \( \mu \) is really equal to 35. Instead, we assume that the effect size is small (.20) and calculate our power with a sample size of 25. Here is the result:

That’s not encouraging. The result says that our power to detect a small effect of .20 is only .16. This implies that even if the null hypothesis is false because the true effect really is .20, we would be unable to detect it in \( 100 \times (1-.16) = 84\% \) of our samples.
Finally, we do a ‘minimum detectable effect size’ analysis. This asks, given our sample size and desired power, what is the smallest effect size we could expect to detect. We choose power = .90, so that we are asking specifically how large the true effect would need to be in order for 90% of our imaginary repeated samples to detect it. The answer is that the effect would need to be quite large (0.675905 ≈ .68) in order for it to be detected 90% of the time using a sample of 25: