

# Homework 2, Your Name

**DUE: Monday, February 10th, at 8pm via Canvas Submission.**

Please submit the solution in the form of R Markdown report, knitted into either of the available formats (HTML, pdf or Word). Provide all relevant code and output. Goal of this homework is to have you 1) familiarized with concepts of power & Type II error for significance tests; 2) practice your R coding.

## Problem #1

1. Use the <https://istats.shinyapps.io/power/> app to do **exercise** 9.66 from Agresti book.
2. Presume you've developed a skin cancer treatment and you were granted permission to test it out on patients. You would like to test if its accuracy differs from the golden standard method which has 28% cure rate. In particular, you'd want the ability to correctly detect a difference of 10% (practically significant effect).

**Hint:** To answer parts (c), (d), (e), you can use the in-class *R* code from *Slides\_1.R*, playing around with the parameters.

Proceed to

- a. Formulate the hypotheses for the one-sample proportion test.
- b. Interpret the statement: "At a 0.05 significance level, the significance test will have 0.77 power when detecting a difference of 10%."
- c. Presume we witness your treatment's results for 100 patients. Obtain the power of one-sample proportion test at  $\alpha = 0.05$  significance level when detecting a difference of 10%.
- d. Presume we witness your treatment's results for 100 patients. Obtain the  $\alpha$  significance level needed for your test to have the power of 0.85 when detecting a difference of 10%.
- e. What # of patients is needed for your test to have the power of 0.85 when detecting a difference of 10% (at  $\alpha = 0.05$  significance level)?
- f. In this case, do you think it is more important for your test to have lower significance level or higher power? Explain.
- g. Provided that you don't have the resources to recruit more than  $n = 100$  patients, what can you do in order to increase the power of your test for detecting 10% difference (**Hint:** See part (d)).