Swimming with dolphins can certainly be fun, but is it also therapeutic for patients suffering from clinical depression? To investigate this possibility, researchers recruited 30 subjects aged 18-65 with a clinical diagnosis of mild to moderate depression. These 30 subjects went to an island off the coast of Honduras, where they were randomly assigned to one of two treatment groups. Both groups engaged in the same amount of swimming and snorkeling each day, but one group swam in the presence of bottlenose dolphins and the other (control) group did not. At the end of two weeks, each subject’s level of depression was evaluated, as it had been at the beginning of the study. The researchers found that 10 of the 15 patients who swam with dolphins experienced substantial improvement in their depression symptoms, compared to 3 of the 15 patients in the control group.

a) Organize the data into a 2×2 table, with the explanatory variable in columns.

b) For each group, determine the sample proportion who experienced substantial improvement. Also calculate the difference between these proportions.

c) Describe how you could use index cards to conduct a simulation analysis for determining whether the difference between these proportions is statistically significant. Include the following information in your description:
   i) how many cards you would use
   ii) how many cards would be marked in what way
   iii) how many cards you would deal out into which groups
   iv) which kinds of cards you would then count
   v) how you would determine an approximate p-value, after you conducted a large number of repetitions

d) Describe the null model underlying your simulation analysis.

e) Use the Two Proportions applet to conduct a simulation analysis with 10,000 repetitions. Submit a screen capture of the applet results. Also determine (and report) the approximate p-value from this simulation analysis.

f) Provide a complete, detailed interpretation (in one or two sentences) of what this (approximate) p-value measures in this context (i.e., what is it the probability of?)

g) Based on this approximate p-value, is the observed difference between the groups statistically significant at the $\alpha = .05$ level? Justify your answer.
h) Summarize your conclusion. Be sure to address issues of generalizability and causation as well as statistical significance.