Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**The Land of Independence Task**

**Part 1** – Confirming Independence



This equation is known as necessary and sufficient. It works exactly like a biconditional statement: two events A and B are independent if and only if the equation is true. It is a must!

1. Based upon the definition of independence, determine if each set of events below are independent.
   1. 
   2. 
   3. 
   4. 
2. Determine the missing values so that the events A and B will be independent.
3. 
4. 

**Part 2** – Independence and Inference

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 clinical diagnosis of mild to moderate depression. Subjects went to an island off the coast of Honduras, where they were randomly assigned to one of two groups. Both groups engaged in the same amount of swimming and snorkeling each day, but one group (the animal care program) did so in the presence of bottlenose dolphins and the other group (outdoor nature program) 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 following table summarizes the results of this study:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Showed Substantial Improvement | No Substantial Improvement | Total |
| Animal Care Program (dolphin therapy) | 10 | 5 | 15 |
| Outdoor Nature Prog  (control group) | 3 | 12 | 15 |
| Total | 13 | 17 | 30 |

1. What proportion of the subjects showed substantial improvement?
2. What proportion of the subjects showed substantial improvement give they received dolphin therapy?
3. It the treatment and improvement status are independent, what numerical value would you expect for the proportion in the dolphin therapy group?
4. Does the likelihood of getting better depend on the type of treatment?

**Gender vs. Commute** – What else might gender affect? Is your commute to work related to whether or not you are male or female? The data below allows you to investigate these questions by presenting gender data against the minutes needed to commute to work each day.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Under 30 minutes | Between 30 minutes and an hour | Over an hour |  |
| Male | 65 | 24 | 15 |  |
| Female | 64 | 22 | 7 |  |
|  |  |  |  |  |

By finding various probabilities from the table above, decide whether or not a person’s gender is related to their commute time to work. Write your conclusion below and include any relevant calculations.