

Directions: *Show all your work. Indicate clearly the methods you use, because you will be graded on the correctness of your methods as well as the accuracy and completeness of your results and explanations.*

11. "Red tide" is a bloom of poison-producing algae - a few different species of a class of plankton called dinoflagellates. When weather and water conditions cause these blooms, shellfish such as clams living in the area develop dangerous levels of a paralysis-inducing toxin. In Massachusetts, the Division of Marine Fisheries (DMF) monitors levels of the toxin in clams; if the amount of toxin exceeds $800 \mu\text{g}$ (micrograms) per kg of clam meat in any area at a 5% level of significance, clam harvesting is banned there until the bloom is over and levels of toxin in clams subside. During a bloom, the distribution of toxin levels in clams on a single mudflat is distinctly non-normal.
- Define the parameter of interest and state appropriate hypotheses for the DMF to test. **[3 pts]**
 - Because of budget constraints and the large number of coastal areas that must be tested, the DMF would like to sample no more than 10 clams from any single area. Explain why this sample size may lead to problems in carrying out the significance test from part (a). **[2 pts]**
 - Describe a Type I and Type II error in this situation and the consequences of each. **[4 pts]**
 - The DMF is considering changing the significance level to the test to 10%. Discuss the impact this might have on error possibilities and the power of the test, and describe the practical consequence of this change. **[3 pts]**

12. Tai Chi is often recommended as a way to improve balance and flexibility in the elderly. Below are before-and-after flexibility rating (on a 1 to 10 scale, 10 being most flexible) for 8 men in their 80's who took Tai Chi lessons for six months.

Subject	A	B	C	D	E	F	G	H
Flexibility rating after Tai Chi	2	4	3	3	3	4	5	10
Flexibility rating before Tai Chi	1	2	1	2	1	4	2	6

Is there statistically significant evidence to suggest that Tai Chi improves flexibility at the 5% significance level?

[14 pts]