# Application exercise 4.1:
Zinc levels

Team name: _____

Lab section: 8:30   10:05   11:45   1:25   3:05   4:40

Write your responses in the spaces provided below. WRITE LEGIBLY and SHOW ALL WORK! Only one submission per team is required. One team will be randomly selected and their responses will be discussed and graded. Concise and coherent are best!

1. Trace metals in drinking water affect the flavor and an unusually high concentration can pose a health hazard. Ten pairs of data were taken measuring zinc concentration in bottom water and surface water at 10 randomly sampled locations. The distributions are shown below. We want to evaluate whether the true average concentration in the bottom water *exceeds* that of surface water? Note that water samples collected at the same location, on the surface and in the bottom, cannot be assumed to be independent of each other. The differences are calculated as $bottom - surface$.
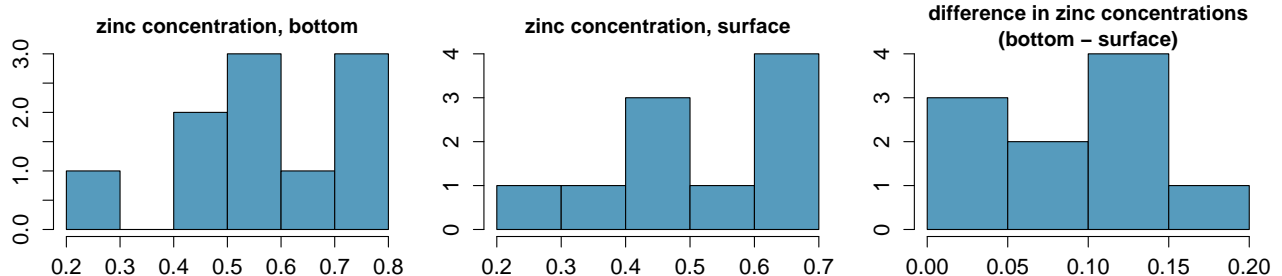

	$\bar{x}$	s	n
bottom	0.5649	0.1468	10
surface	0.4845	0.1312	10
diff	0.0804	0.0523	10

   (a) Define the parameter of interest and the point estimate, and state the value of the point estimate.

(b) Conduct a hypothesis test answering the research question. Don't forget to check conditions first. Use $\alpha = 0.05$. Make sure to frame your conclusion in context of the data and the research question.

(c) Calculate a confidence interval for the parameter of interest at the confidence level equivalent to the previous hypothesis test. Make sure to interpret the interval in context of the research question.

2. Since 2005, the American Community Survey polls ~3.5 million households yearly. The following summarizes distribution of salaries of males and females from a random sample of individuals who responded to the 2012 ACS:

	$\bar{x}$	s	n
male	55,890	68,767.88	470
female	29,240	32,025.98	373
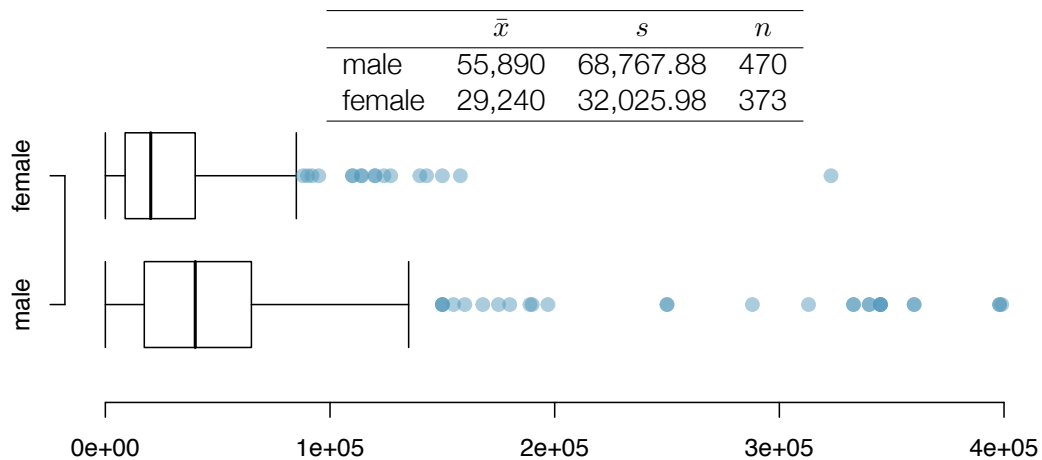
We want to evaluate whether salaries of men and women are different, on average.

(a) Define the parameter of interest and the point estimate, and calculate the point estimate.

(b) Conduct a hypothesis test answering the research question. Don't forget to check conditions first. Use $\alpha = 0.10$. Make sure to frame your conclusion in context of the data and the research question.

(c) Calculate a confidence interval for the parameter of interest at the confidence level equivalent to the previous hypothesis test. Make sure to interpret the interval in context of the research question.