

## Homework 1

Do the following problems on a separate sheet of paper.

Additional suggested problems:

1C: 1, 3-7, 39-50, 55-59, 63-64, 69-70, 71, 74, 80-82

Alice is going on a SCUBA diving trip in the Chesapeake Bay. She borrowed your biology book and set of dichotomous keys so she can identify the local wildlife.

1. As a warmup, solve for  $x$  in the following equations:

(a)  $\frac{x}{4} = \frac{x}{5} + 1$

(b)  $x^2 - x - 6 = 0$

2. First she has to make sure she understands the statements in the biology books. Draw Venn diagrams corresponding to the following categorical propositions.

(a) All crabs are invertebrates.

(b) No invertebrates have backbones.

(c) Some dolphins can use tools.

3. Before she goes diving, Alice decides to look at the ships in the docks. Some of them are warships, and some of them are sailing ships. Draw a Venn diagram showing the relationship between those two categories, and then place the following ships in the appropriate regions:

(a) A Sunfish (a 13 foot recreational sailboat)

(b) A barge

(c) The USS Constitution (a three masted US Navy frigate launched in 1797)

4. Alice finally goes diving near the Baltimore harbor. She classifies the animals she sees by whether they have spines, whether they have tentacles, and whether they have gills. She saw 30 different species. Here are her notes:

- 3 species had a spine, tentacles, and gills
- 5 species had tentacles and gills
- 11 species had a spine and gills
- 4 species had a spine and tentacles
- 14 species had a spine
- 10 species had tentacles
- 17 species had gills

(a) Draw a Venn diagram, and label all of the appropriate regions with the number of species.

(b) How many species didn't have a spine, tentacles, or gills?

(c) A merman named Jeffrey is also taking notes on the species in the area. Where on the Venn diagram would he put Alice?