

Math 162

Quiz 2

Show all work in a neat and organized fashion. Clearly indicate your answers.
10 points possible.

1. (3 pts.) Swap the inputs and outputs for the function below. (1) draw an input/output diagram for the swapped rule, (2) write out the swapped rule in words, and (3) determine whether the swapped rule is a function.

$R(w)$ = the first-class postal rate (in cents) of a letter weighing w ounces

2. (2 pts.) (Based on data from Ryan and Gross, “The Diffusion of Hybrid Seed Corn in Two Iowa Communities,” *Rural Sociology*, March 1943.) The percentages of Iowa corn farmers in two communities who had heard about, and who had planted, hybrid seed corn t years after 1924 can be modeled as follows.

$$\begin{aligned}\text{Percentage hearing} &= h(t) = \frac{100}{1 + 128.04e^{-0.72t}} \text{ percent,} \\ \text{Percentage planting} &= p(t) = \frac{100}{1 + 913.72e^{-0.61t}} \text{ percent}\end{aligned}$$

Write a model for the percentage of Iowa farmers who had heard about but not yet planted hybrid seed corn t years after 1924.

(Be sure to give the correct model/formula, the correct label for the units of the output, and the correct explanation of the input variable including units.)

(Note: For this problem, the correct label for the units of the output is “percent,” and the correct explanation of the input variable is “where t is the number of years since 1924.”)

3. (2 pts.) (a) Graph $y = 420 + x$ and $y = -50 - x$ on the same screen. Zoom out (or change the window yourself) until you can see that these are two intersecting lines. Sketch the graph on this page, and write down the values of Xmin, Xmax, Ymin, and Ymax that give this picture (press Window to see these values).

(b) Use Zbox to examine the intersection from part (a). After using Zbox several times, sketch the graph on this page, and write down the values of Xmin, Xmax, Ymin, and Ymax that give this picture.

4. (3 pts.) A mail-order company charges a percentage of the amount of each order for shipping. For orders up to \$30, the charge is 15% of the order amount. For orders of greater than \$30 up to \$50, the charge is 12%. For orders of greater than \$50 up to \$80, the charge is 10%. For orders of greater than \$80, the charge is 8%.

Use a piecewise defined function to write a model for the shipping charge for an order of x dollars.

(Be sure to give the correct model/formula, the correct label for the units of the output, and the correct explanation of the input variable including units.)