

Chapter 4:5: Optimization and Modeling

Calculus I

College of the Atlantic. Winter 2021

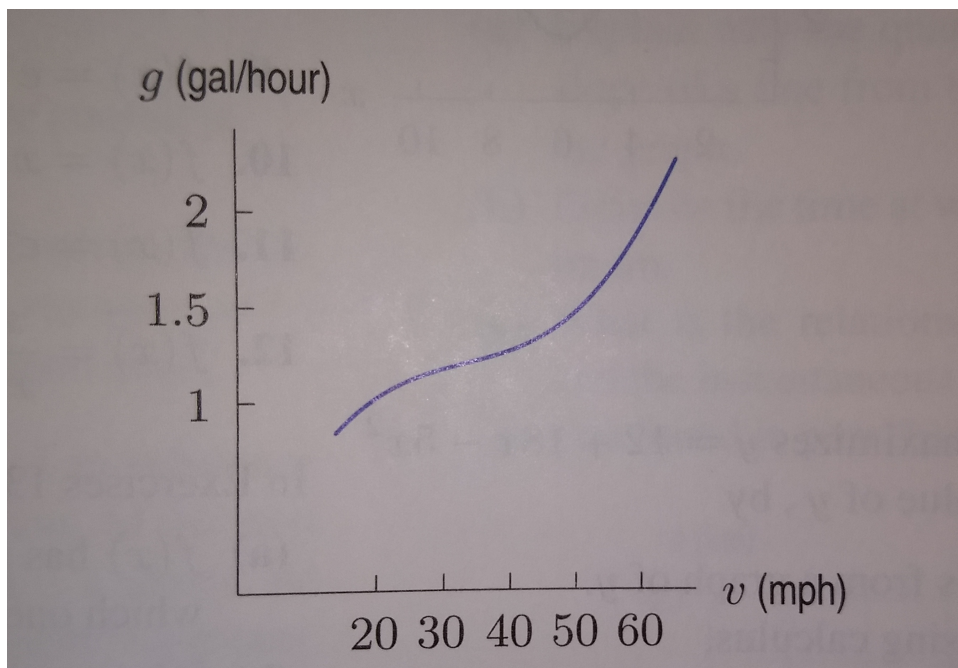


Figure 1: Gas consumption in gallons/hour as a function of speed in miles per hour.

1. Figure 1 shows the gas consumption of a car (in gal/hour) as a function of the car's speed (in miles/hour). What speed minimizes the car's consumption measured in gallons per mile?
2. You have a piece of wire of length L . You wish to use this wire to make a rectangle. What dimensions for the rectangle will maximize the area?
3. You need to make a cylindrical can that has a volume of 1000. What dimensions for the can will use the smallest amount of material?
4. The strength of a rectangular beam of width w and height h is proportional to hw^2 . A beam is to be cut from a log of radius r . What beam dimensions maximize the strength of this beam?
5. What point along the curve $y = \sqrt{x}$ is closest to the point $(4, 0)$?