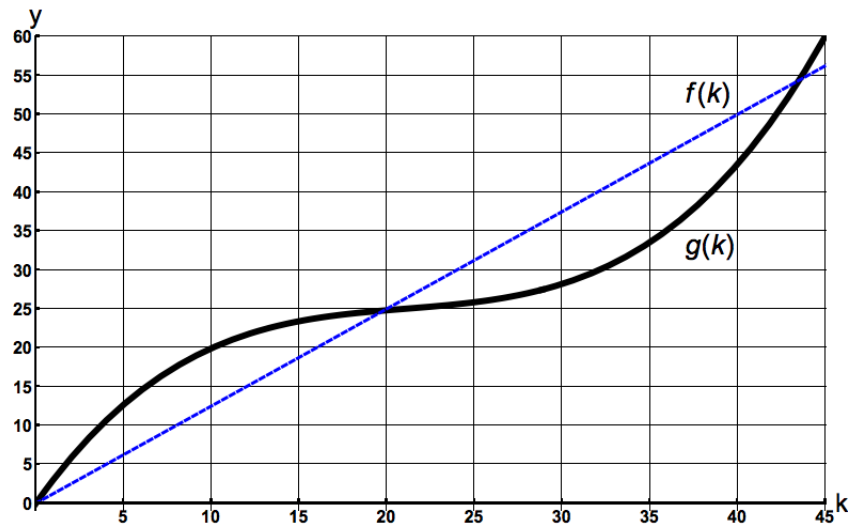


5. [10 points] A company produces keychains. Let $f(k)$ be the revenue (in thousands of dollars) the company gets by selling k thousand keychains. Let $g(k)$ be the company's cost (in thousands of dollars) of manufacturing k thousand keychains. The graphs of the functions $f(k)$ (thin line) and $g(k)$ (thick line) are shown below.



Answer the following questions using the information provided in the graph above.

- a. [2 points] How many keychains does the company produce if it spends 20,000 dollars manufacturing them?

Solution: 10 thousand keychains.

- b. [2 points] For which values of $0 \leq k \leq 45$ is the function $g(k)$ concave down?

Solution: $0 \leq k \leq 20$.

- c. [2 points] What is a practical interpretation of the slope of the function $f(k)$?

Solution: The revenue in dollars of selling each keychain.

- d. [4 points] The profit obtained by the company is defined as the difference between the revenue obtained from selling keychains and the cost of producing them. Negative profits should be interpreted as losses.

- i) Estimate the number of keychains the company needs to produce in order to obtain profits. Write your answer in interval notation or using inequalities.

Solution: $20 < k < 43$

- ii) Estimate the amount of keychains the company needs to manufacture in order to obtain the maximum profits.

Solution: About 34 thousand keychains.