



T^{LE} ES HOMEWORK
TO HAND IN BY JANUARY 21ST 2013



A company sells masonry sand at a price varying between 10 and 80€ per ton.

The **demand** $f(x)$ is the quantity of sand (in thousands of tons) that the consumers are ready to buy at the price x (in tens of € per tons)

The **supply** $g(x)$ is the quantity of sand (in thousands of tons) that the producers are ready to sell at the price x (in tens of € per tons)

We take is given that :

$$f(x) = 6 - 1.3 \ln x, \text{ where } 1 \leq x \leq 8$$

$$g(x) = 5 - e^{1-0.2x}, \text{ where } 1 \leq x \leq 8$$

Opposite are the graphs of f and g .

1. a. Study the variations of f on $[1;8]$.
b. Solve $f(x) \leq 3.5$ and deduce the price from which onwards the demand is less than 3500t (round to 0.1€)
2. The **balance price** is the one for which the demand and the supply are equal.

Let's denote $d(x) = f(x) - g(x)$ for $1 \leq x \leq 8$.

- a. Justify that d is strictly decreasing on $[1;8]$.
- b. Prove the equation $d(x) = 0$ has a unique solution x_0 in $[1;8]$ and find an approximate value (to the hundredth) of x_0 with your calculator.
- c. Deduce the approximate value (rounded to the nearest €) of the balance price and the corresponding demand (to the nearest ten of tons).
- d. Check your results on the graph.

