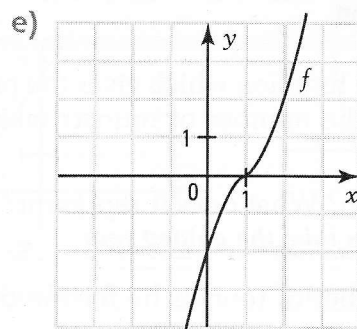


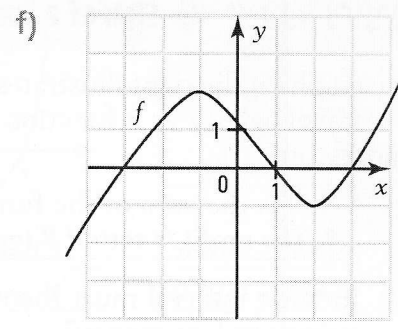
$$f \geq 0 \text{ in }]-\infty, 1] \cup [3, +\infty[$$

$$f \leq 0 \text{ in } [1, 3]$$



$$f \geq 0 \text{ in } [1, +\infty[$$

$$f \leq 0 \text{ in }]-\infty, 1]$$

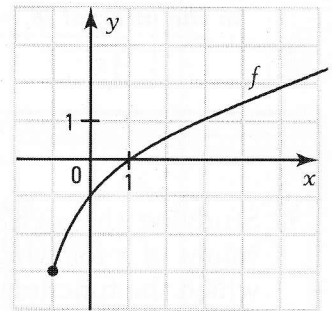


$$f \geq 0 \text{ in } [-3, 1] \cup [3, +\infty[$$

$$f \leq 0 \text{ in }]-\infty, -3] \cup [1, 3]$$

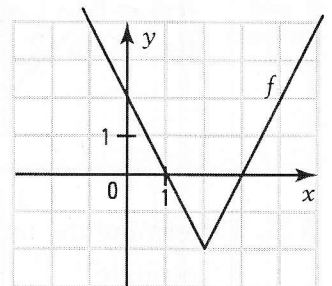
14. Consider the function f represented on the right.

- a) What is the domain of f ? $[-1, +\infty[$
- b) What is the range of f ? $[-3, +\infty[$
- c) What is the zero of f ? 1
- d) What is the initial value of f ? -1
- e) Find the interval for which the function f is
1. positive. $[1, +\infty[$
 2. strictly negative. $[-1, 1[$



15. Consider the function f represented on the right.

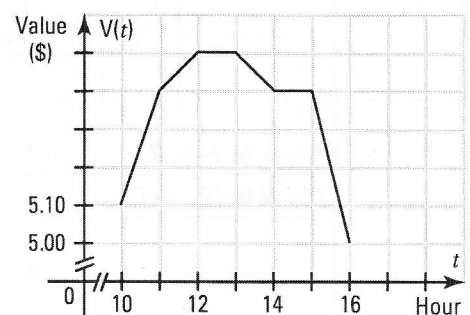
- a) What is the domain of f ? \mathbb{R}
- b) What is the range of f ? $[-2, +\infty[$
- c) What is (are) the zero(s) of f ? $1 \text{ and } 3$
- d) What is the initial value of f ? 2
- e) Find the interval for which the function f is
1. strictly positive. $]-\infty, 1[\cup]3, +\infty[$
 2. negative. $[1, 3]$



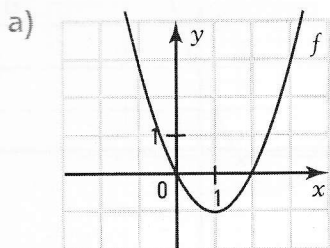
ACTIVITY 5 Variation of a function

The graph on the right illustrates, hour by hour, the value of a share for the Kandev Company traded on the Montreal stock exchange.

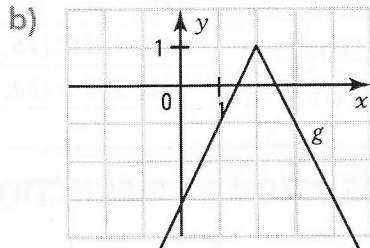
- a) Does the value of the share increase or decrease between the 10th and 11th hour? *It increases.*
- b) What can be said about the value of the share between the 12th and 13th hour? *It remains constant.*
- c) Does the value of the share increase or decrease between the 13th and 14th hour? *It decreases.*



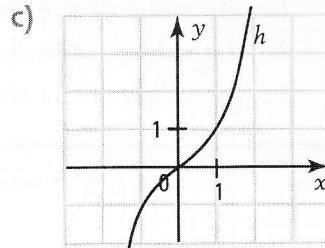
17. Give the increasing and decreasing intervals of the following functions.



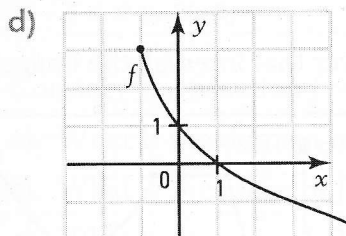
f is decreasing over $]-\infty, 1]$.
f is increasing over $[1, +\infty[$.



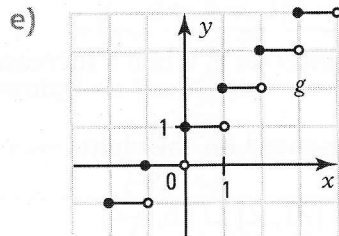
g is increasing over $]-\infty, 2]$.
g is decreasing over $[2, +\infty[$.



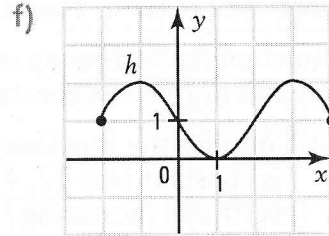
h is increasing over \mathbb{R} .
h is never decreasing.



f is never increasing.
f is decreasing over $[-1, +\infty[$.

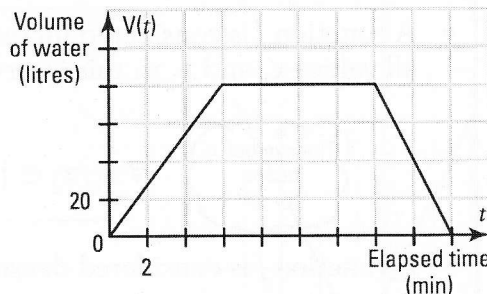


g is increasing over \mathbb{R} .
g is never decreasing.



h is increasing over $[-2, -1] \cup [1, 3]$.
h is decreasing over $[-1, 1] \cup [3, 4]$.

18. Raphael has taken a bath. The graph on the right illustrates the variation of the volume of water in the bath from the moment he turned on the faucet.



a) Indicate and interpret the interval where the function *V* is strictly increasing.

his, 6]. From 0 to 6 minutes, Raphael is filling his bath.

b) Indicate and interpret the interval where the function *V* is constant.

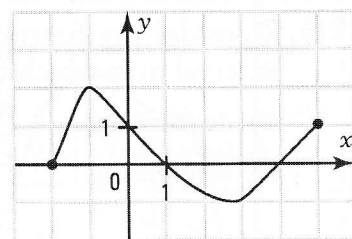
[6, 14]. It is over this interval of time, lasting 8 minutes, that Raphael bathed.

c) Indicate and interpret the interval of time where the function *V* is strictly decreasing.

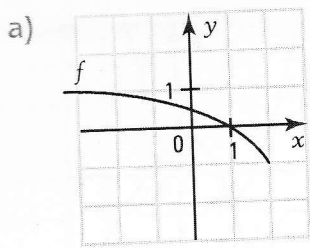
[14, 18]. It is over this interval of time, lasting 4 minutes, that Raphael emptied his bath.

19. Draw the graph of a function *f* that satisfies the following conditions.

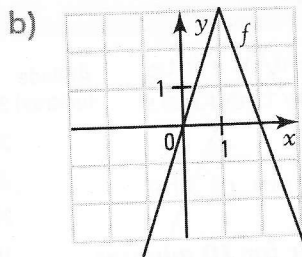
1. $f \geq 0$ in $[-2, 1] \cup [4, 5]$.
2. $f \leq 0$ in $[1, 4]$.
3. $f \nearrow$ in $[-2, -1] \cup [3, 5]$.
4. $f \searrow$ in $[-1, 3]$.



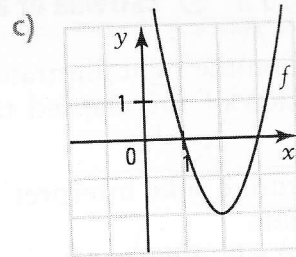
20. Determine, when they exist, the maximum and minimum of the following functions.



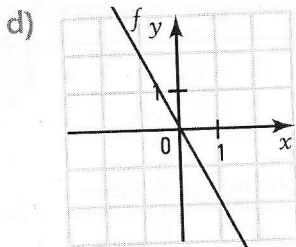
$\min f = -1$



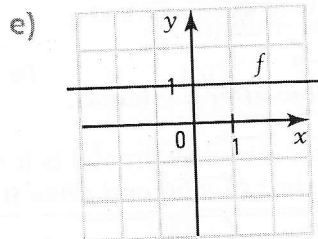
$\max f = 3$



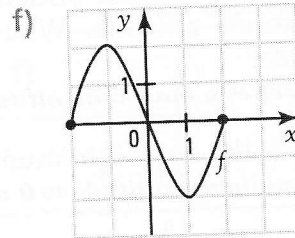
$\min f = -2$



no extrema



$\max f = 1, \min f = 1$



$\max f = 2, \min f = -2$

21. Given the function on the right.

a) Determine

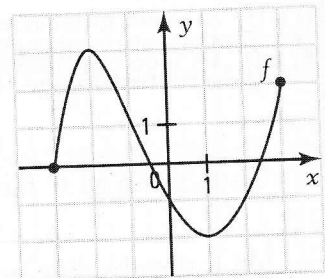
1. dom f . $[-3, 3]$ 2. ran f . $[-2, 3]$

b) For what value of x does the function reach its absolute maximum? What is this absolute maximum?

The absolute maximum of f is 3 when $x = -2$.

c) For what value of x does the function reach its absolute minimum? What is this absolute minimum?

The absolute minimum of f is -2 when $x = 1$.



22. The graph on the right illustrates the profit $P(x)$ (in \$) generated from selling x video cameras in one week. This company cannot produce more than 80 cameras per week.

a) Determine

1. dom P . $[0, 80]$ 2. ran P . $[-4000, 8000]$

b) Determine and interpret the zeros of P .

The profit is zero when 20, 40 or 60 cameras are sold.

c) Determine the increasing and decreasing intervals for P .

The profit increases over $[0, 30] \cup [50, 80]$ and decreases over $[30, 50]$.

d) Determine and interpret the absolute maximum and minimum of this profit function.

For 0 cameras sold, the company generates its absolute minimum profit, which is a loss of \$4000. For 80 cameras sold, the company generates its absolute maximum profit of \$8000.

e) Determine the relative maximum and minimum of this function.

Rel. max. = 3000 Rel. min. = -1000

