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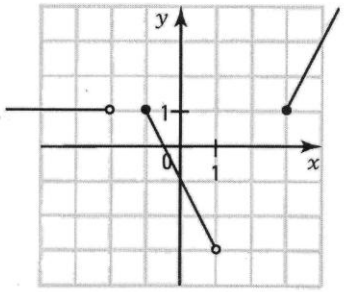
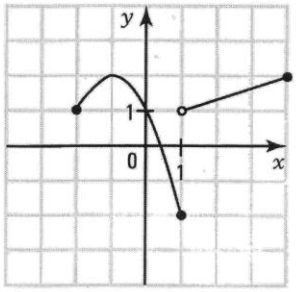
1. Graph the following functions.

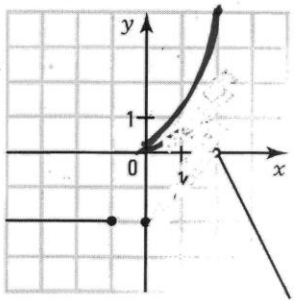
a) $f_1(x) = \begin{cases} 1 & \text{if } x < -2 \\ -2x - 1 & \text{if } -1 \leq x < 1 \\ 2x - 5 & \text{if } x \geq 3 \end{cases}$



b) $f_2(x) = \begin{cases} -(x+1)^2 + 2 & \text{if } -2 \leq x \leq 1 \\ \frac{1}{3}x + \frac{2}{3} & \text{if } 1 < x \leq 4 \end{cases}$



c) $f_3(x) = \begin{cases} -2 & \text{if } x \leq -1 \\ x^2 & \text{if } 0 \leq x \leq 2 \\ -2x + 4 & \text{if } x > 2 \end{cases}$



2. For each of the piecewise functions given in number 1, find

a) the domain and range.

dom f_1 =]-∞, -2[∪ [-1, 1[∪ [3, +∞[; ran f_1 =]-3, +∞[

dom f_2 = [-2, 4]; ran f_2 = [-2, 2]

dom f_3 =]-∞, -1] ∪ [0, +∞[; ran f_3 =]-∞, 2]

b) the image of 2.

$f_1(2)$: does not exist; $f_2(2)$: $\frac{4}{3}$; $f_3(2)$: 2

c) the initial value.

$y_1 = -1$; $y_2 = 1$; $y_3 = -2$

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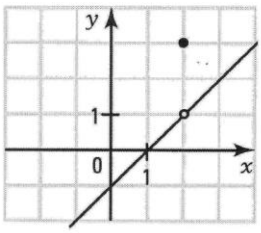
3. Graph the following functions and determine their domain.

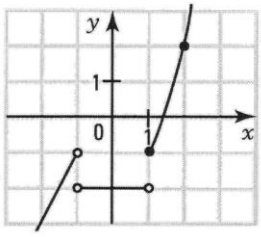
a) $f(x) = \begin{cases} x - 1 & \text{if } x \neq 2 \\ 3 & \text{if } x = 2 \end{cases}$

dom $f = \mathbb{R}$



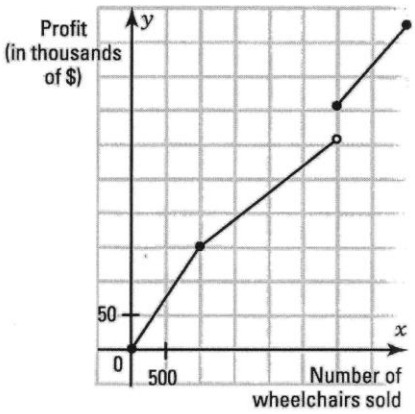
b) $f(x) = \begin{cases} 2x + 1 & \text{if } x < -1 \\ -2 & \text{if } -1 < x < 1 \\ x^1 - 2 & \text{if } x \geq 2 \end{cases}$

dom $f = \mathbb{R} \setminus \{-1\}$



4. The Kandev company sells wheelchairs to residences for the elderly. The function f which gives the annual net profit y (in thousands of dollars) as a function of the number x of wheelchairs sold is given by the rule:

$$f(x) = \begin{cases} 0.15x & 0 \leq x \leq 1000 \\ 0.08x + 70 & 1000 < x < 3000 \\ 0.12x & 3000 \leq x \leq 4000 \end{cases}$$



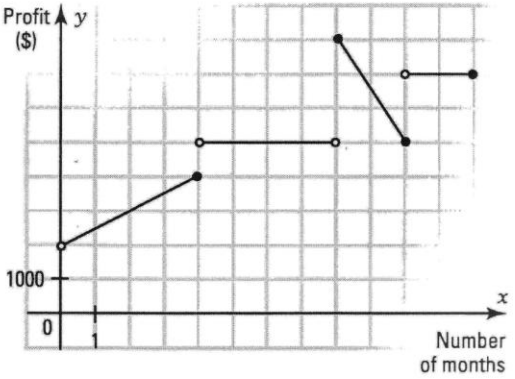
a) If the maximum number of wheelchairs sold per year is 4000, draw the graph of this function.

b) Find dom f. ***[0, 4000]***

c) What is the profit made from selling 2500 wheelchairs? ***$270***

d) Over what interval is the rate of change the greatest? ***[0, 1000]***

5. The piecewise function f represented on the right gives a company's accumulated profit $f(x)$ as a function of the number x of elapsed months.



a) What is the company's accumulated profit after

1. 2 months? ***$3000*** 2. 4 months? ***$4000***
3. 6 months? ***$5000*** 4. 11 months? ***$7000***

b) Determine the number of elapsed months if the company's accumulated profit is

1. $3000. ***2 months***
2. $6500. ***9 months***

c) Determine the rule of the function f.

$$f(x) = \begin{cases} 500x + 2000 & \text{if } 0 < x \leq 4 \\ 5000 & \text{if } 4 < x < 8 \\ -1500x + 20\,000 & \text{if } 8 \leq x \leq 10 \\ 7000 & \text{if } 10 < x \leq 12 \end{cases}$$

d) Over what interval is the function f

1. strictly increasing? ***]0, 4]***
2. strictly decreasing? ***[8, 10]***
3. constant? ***]4,8[or]10,12]***