Relatório de Resoluções

O código de cada membro pode ser consultado a seguir:

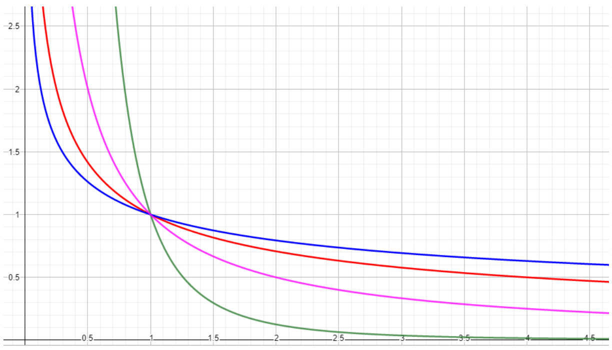
x_{05}: José Soares Jr.	x_{11}: Luca Monaco
x_{06}: Maurício Damião	x_{15}: Rodrigo Melendez
x_{08}: Pedro Lopes Silva	x_{18}: Matheus Cardoso
x_{09}: Rafael Maddalena	x_{20}: Gustavo Zequini

Resolução (‖ Questão: 4.8.1 ‖ Relator: $\mathbf{x_{08}}$ ‖ Revisor: $\mathbf{x_{06}}$ ‖)

Sketch the graphs of $y = x^{-3}$, $y = x^{-1}$, $y = x^{-\frac{1}{2}}$, and $y = x^{-\frac{1}{3}}$, defined for $x > 0$.

Seja a linha vermelha representante da função $y = x^{-\frac{1}{2}}$, a linha verde representante da função $y = x^{-3}$, a linha rosa representante da função $y = x^{-1}$ e a linha azul representante da função $y = x^{-\frac{1}{3}}$. Assim temos o seguinte gráfico: Considere o eixo x sendo o eixo da horizontal e o eixo y o eixo da vertical.

Figure 1: $y = x^{-3}$, $y = x^{-1}$, $y = x^{-\frac{1}{2}}$, and $y = x^{-\frac{1}{3}}$, defined for $x > 0$



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Resolução (‖ Questão: 4.8.2 ‖ Relator: $\mathbf{x_{09}}$ ‖ Revisor: $\mathbf{x_{08}}$ ‖)

Usando uma calculadora, encontre os valores aproximados de $\sqrt{2^{\sqrt{2}}}$ e π^π

$\sqrt{2^{\sqrt{2}}} \approx 1.6325269194$

$\pi^\pi \approx 36.4621596072$ ■

Resolução (‖ Questão: 4.8.3 ‖ Relator: $\mathbf{x_{11}}$ ‖ Revisor: $\mathbf{x_{09}}$ ‖)

3. Solve the following equations for x:
a)$2^{2x} = 8$

$$2^{2x} = 2^3 \tag{1}$$

$$2x = 3 \rightarrow x = \frac{3}{2} \tag{2}$$

b)$3^{3x+1} = \frac{1}{81}$

$$3^{3x+1} = 81^{-1} \tag{3}$$
$$3^{3x+1} = 3^{-4} \tag{4}$$
$$3x + 1 = -4 \tag{5}$$
$$x = -\frac{5}{3} \tag{6}$$

c)$10^{x^2-2x+2} = 100$

$$10^{x^2-2x+2} = 10^2 \tag{7}$$
$$x^2 - 2x + 2 = 2 \tag{8}$$
$$x^2 - 2x = 0 \tag{9}$$
$$x(x-2) = 0 \tag{10}$$
$$x = 0, x = -2 \tag{11}$$

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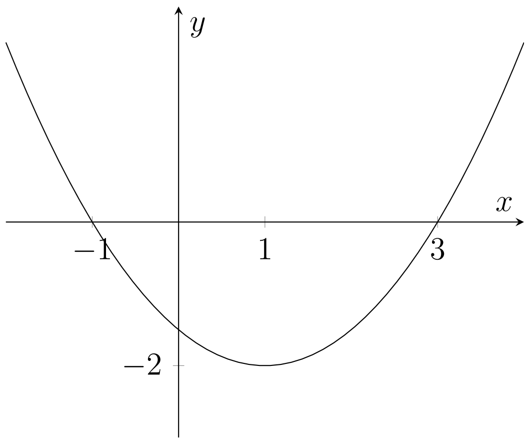
Resolução (|| Questão: 4.8.4 || Relator: $\mathbf{x}_{15}$ || Revisor: $\mathbf{x}_{11}$ ||)

Match five of the graphs A–F in Figs 4.8.5 to 4.8.10 with each of the functions (a)–(e) below. Then specify a suitable function in (f) that matches the sixth graph.

a) $y = \dfrac{1}{2}x^2 - x - \frac{3}{2}$

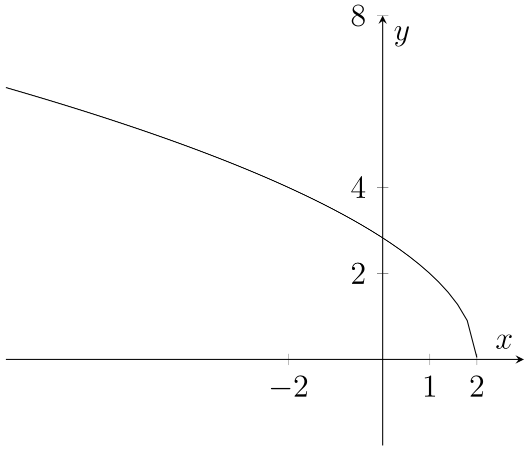
The function can be assigned to the following graph:



As a quadratic function with $a > 0$, it assumes a U shape. We also see that the point $(1, -2)$ in the graph belongs to the function:
$\dfrac{1}{2}1^2 - 1 - \dfrac{3}{2} = \dfrac{1}{2} - 1 - \dfrac{3}{2} = -2$

b) $y = 2\sqrt{2-x}$

The function can be assigned to the following graph:



As our function is $y = 2\sqrt{2-x}$, we know that $2 - x \geq 0$, because the square root of a negative number is not defined. Then:

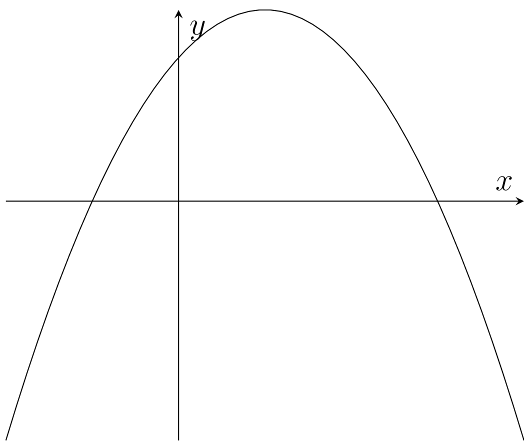
$$2 - x \geq 0 \Leftrightarrow x \leq 2 \tag{12}$$

Therefore the domain of the function is defined as $D = (-\infty, 2]$, as we can verify in the graph.

Also, as $2 - x$ is raised to the power of $\frac{1}{2}$, the power is between 0 and 1, so the curve will be exactly the same as the graph.

c) $y = -\frac{1}{2}x^2 + x + \frac{3}{2}$

The function can be assigned to the following graph:

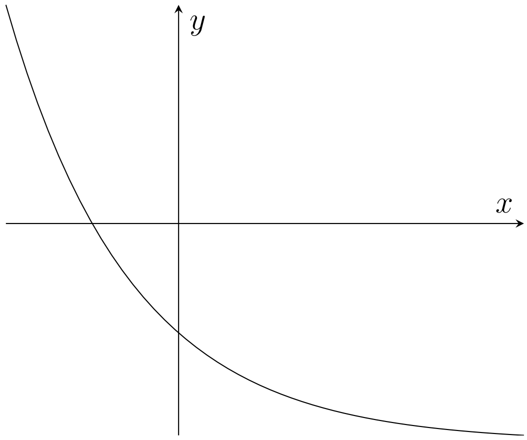


As it is a quadratic function, with $a < 0$, it will have the $\cap$ shape, as shown in the graph.

We also know that the function will cross the y axis at $\frac{3}{2} > 0$, and we can see that the function crosses the y axis in some positive number.

d) $y = (\frac{1}{2})^x - 2$

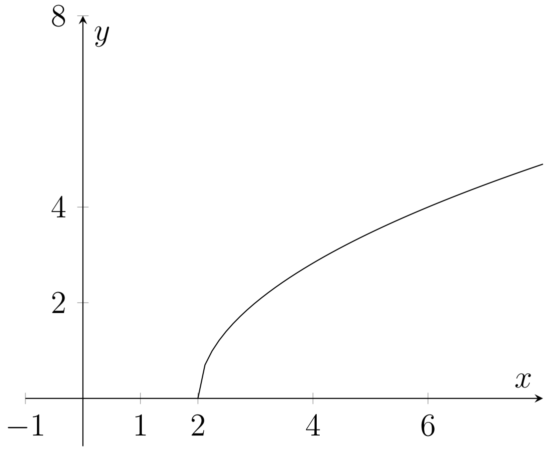
The function can be assigned to the following graph:



As $(\frac{1}{2})^x - 2 = 2^{-x} - 2$ it is clear that the power will be negative for positive x and positive for negative x, so the curve will be like the curve of 2^x mirrored.

e) $y = 2\sqrt{x-2}$

The function can be assigned to the following graph:



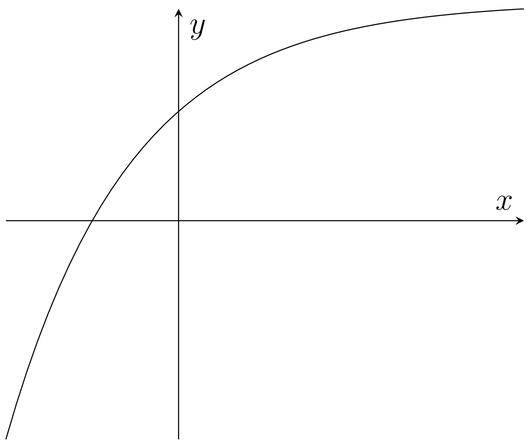
As our function is $y = 2\sqrt{x-2}$, we know that $x - 2 \geq 0$, because the square root of a negative number is not defined. Then:

$$x - 2 \geq 0 \Leftrightarrow x \geq +2 \qquad (13)$$

Therefore the domain of the function is defined as $D = [2, +\infty)$, as we can verify in the graph.

Also, as $x - 2$ is raised to the power of $\frac{1}{2}$, the power is between 0 and 1, so the curve will be exactly the same as the graph.

f) The following graph:



Can be assigned to the following function:

$$y = -(\frac{1}{2})^x + 2 \tag{14}$$

As $-(\frac{1}{2})^x + 2 = -(2)^{-x} + 2$, we have that the shape will be as the graph is showing.

■