MATH 120–04 (Kunkle), Quiz 1 | Name: ________________
10 pts, 10 minutes | Jan 18, 2024

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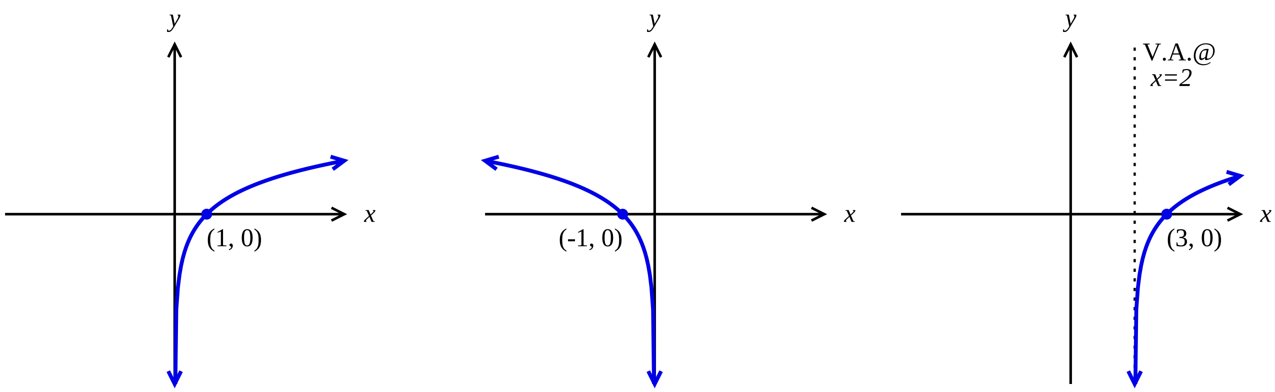
1 (8 pts). Sketch the graph of the function. Your graph doesn't need to be perfect, but it should clearly show the locations of any asymptotes and x-intercepts.

a. $y = \ln(-x)$ b. $y = \ln(x-2)$

2 (2 pts). Evaluate the limit, if it exists: $\lim_{x\to 2^+} \ln(x-2)$

Solution:

1.(Source: 1.5.47.48) Both of these graphs can be obtained from the graph of $y = \ln x$ (below left). In Part a, the graph of $y = \ln(-x)$ is obtained by reflecting the graph of $\ln x$ across the line $x = 0$. In Part b, the graph of $y = \ln(x-2)$ is obtained by shifting the graph of $\ln x$ to the right 2 units.



$y = \ln x$ a. $y = \ln(-x)$ b. $y = \ln(x-2)$

In both of these, it helps to think of where the functions are defined. Since $\ln x$ is defined only for $x > 0$, the function $\ln(-x)$ is defined only when $-x > 0$, or $x < 0$, and the function $\ln(x-2)$ is defined only when $x - 2 > 0$, or $x > 2$.

2.(Source: 2.2.35) $(x-2) \to 0^+$ as $x \to 2^+$, and so $\ln(x-2) \to -\infty$. That is,

$$\lim_{x\to 2^+} \ln(x-2) = -\infty.$$

This infinite limit is the reason for the vertical asymptote we saw in the graph of $\ln(x-2)$ in Problem 1.

For a review of how changes to an equation affect the equation's graph, see

`http://kunklet.people.cofc.edu/MATH111/transformations.pdf`

MATH 120–11 (Kunkle), Quiz 1 — Name: ____________________

10 pts, 10 minutes — Jan 18, 2024

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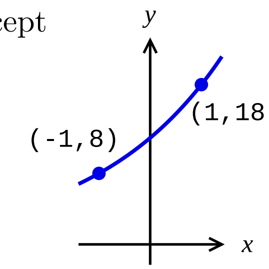
1 (10 pts). Find the constants C and $b > 0$ so that the exponential function $f(x) = Cb^x$ has the graph shown here. What is the y-intercept of this graph?



Solution:

1 (10 pts)(Source: 1.4.21-22) . From the given points obtain the equations

$$(-1, 8) \longrightarrow Cb^{-1} = 8$$
$$(1, 18) \longrightarrow Cb^{1} = 18$$

Solve for C in the first to obtain $C = 8b$. Substitute this into the second and solve for b:

$$8b^2 = 18$$
$$b^2 = \frac{18}{8} = \frac{9}{4}$$

Since $b > 0$,

$$b = \sqrt{\frac{9}{4}} = \frac{3}{2}$$

and

$$C = 8b = 8\frac{3}{2} = 12.$$

That is, $f(x) = 12\left(\frac{3}{2}\right)^x$.

Since $f(0) = C = 12$, the y-intercept is the point $(0, 12)$. **(done)**