Examples:

1. Graph

* Since we are given the function we first start by identifying the parent function. The parent function is . In addition this function has a vertical asymptote, the line Next graph the asymptote and parent function by constructing a table of values after rewriting the function of “” as a function of “.
* Recall that, and le vary in the table of values and solve for lastly plot and connect the points with a smooth curve.

|  |  |
| --- | --- |
|  |  |
|  | -2 |
|  | -1 |
| 1 | 0 |
| 3 | 1 |
| 9 | 2 |

* Second look for the transformations inside the function, since we have the function inside the function is the expression. Since is inside the function the fact two is negative tells us to shift the parent function two units to the right. After undergoing a shift to the right all of the values stay the same. However, all the values increase by two; to show this on the table of values, add two to each value in the domain. So,

|  |  |
| --- | --- |
|  |  |
|  | -2 |
|  | -1 |
| 3 | 0 |
| 5 | 1 |
| 11 | 2 |

* Finally look for the transformations outside of the function, given outside the function is the expression. Since is outside we need to shift, the image of the parent function which is shifted two units to the right, three units up. After undergoing a shift up all of the values stay the same. However, all the values increase by three; to show this on the table of values, add three to each value in the range. So,

|  |  |
| --- | --- |
|  |  |
|  | 1 |
|  | 2 |
| 3 | 3 |
| 5 | 4 |
| 11 | 5 |

∎

2. Find the equation of the logarithmic function passing through points: and when the asymptote is the line

* Because we know the asymptote is this directly implies that our function is . Now we must find and to solve tis problem. To do so we will use the characteristic point of and see what happens to it under the shift left two units, .
* We see that is not in our collection of given points, but is. This means we can find the outside transformation by deriving the transformation that takes , it is easy to see that this is a shift down by one unit which implies and our function becomes
* Now we need to find , this is accomplished by selecting another point from the givens and rewriting the logarithmic function as an exponential function and solving for

Using the point so,

* Use the last point in the givens and the derived function to check your answer by establishing a tautology.

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