 Travelling cane toads

From 1935-37, the American marine toad (Bufo Marinus) was introduced into Queensland, Australia in eight coastal sugar cane districts. Due to a lack of natural predators and an abundant food supply, the population grew and the poisonous toads began to be found far from the region in which they were originally introduced.

The data\* in the table below shows how far “cane toads” spread in the subsequent years.

| Year | Area occupied (km2) |
| --- | --- |
| 1939 | 32 800 |
| 1944 | 55 800 |
| 1949 | 73 600 |
| 1954 | 138 000 |
| 1959 | 202 000 |
| 1964 | 257 000 |
| 1969 | 301 000 |
| 1974 | 584 000 |

This data can be entered into desmos by changing Year to time in years since 1939. That is 1939 is zero, 1944 is 5.   
The area occupied can be entered in units of thousands (e.g. 32.8, 55.8 …).

This data takes roughly an exponential form.

1. Create a model in desmos to fit the data (approximately).  
   Use the model where is a slider with value with steps of 0.01.  
   Fit the model to the data.
2. What is the y-intercept? What does this value represent?
3. From the model, predict the area occupied by cane toads in 1989.
4. The year 2017 is 78 years since 1939.
5. From the model, predict the area occupied by cane toads in 2017.
6. The area of Australia, excluding the Australian Antarctic Territory, is 7.692 million km². How does this compare to your prediction in c)? From this, what could you say about the model you’ve developed?

Source: [geom.uiuc.edu](http://www.geom.uiuc.edu/education/calc-init/population/unbounded.html)