Math 120 KAUST Worksheet 5 September 13th, 2018

Name:

Answer the questions in the spaces provided. Don't hesitate to ask me or your peers for help, this is not a quiz.

1. In a scientific marvel, Will has built a small self replicating robot. One of these robots can create ten copies of itself in a day! Therefore the number of robots grows at an exponential rate.

   (a) (8 points) Write a function $R(t)$ for the number of robots there are after t days.

$$R(t) = 11^t$$

   (b) (4 points) The robots are relatively small, covering only $25mm^2$ of ground space. Write $A(t)$, a function for the total area covered by robots after t days.

$$A(t) = 25 \cdot 11^t$$

   (c) (8 points) The earth has a total surface area of 510.1 million km^2. How long does it take for the robots to cover the entire surface of the globe. (KEEP AN EYE ON UNITS!)

$$510.1 \text{ million } km^2 = 5.101 \times 10^{20}\ mm^2$$

$$25 \cdot 11^t = 5.101 \times 10^{20}$$

$$\text{Or } t = \frac{\ln\left(\frac{5.101 \times 10^{20}}{25}\right)}{\ln(11)} \approx 18.54$$