**3.** [8 points] Let $S(t)$ be the amount of shrimp (in thousands) living in a lake $t$ years after January 1, 2000, where

$$S(t) = 3.27(1.3)^t.$$

**a.** [3 points] In how many years, after January 1, 2000, will the number of shrimps in the lake have increased by 75%? Your answer must be exact or accurate up to the first two decimals.

*Solution:*

$$3.27(1.3)^t = 1.75(3.27)$$
$$(1.3)^t = 1.75$$
$$t \ln(1.3) = \ln(1.75)$$
$$t = \frac{\ln(1.75)}{\ln(1.3)}.$$

**b.** [2 points] What is the continuous growth rate per year of the population of shrimps? Your answer must be exact or accurate up to the first two decimals.

*Solution:* $\quad k = \ln(1.3)$

**c.** [3 points] Let $f(p)$ be the amount of shrimps, in thousands, $p$ **months** after January 1, 2000. What is the growth factor of the function $f(p)$? Your answer must be in **exact** form.

*Solution:* $\quad f(p) = S\left(\frac{p}{12}\right) = 3.27(1.3)^{\frac{p}{12}}$. Growth factor of $f(p)$ is $b = (1.3)^{\frac{1}{12}}$.