

## 4. [9 points]

- a. [4 points] A population of frogs lives in the forest. In 2000, there are 2500 frogs in the forest. The frog's population decreases at a rate of 6.2% per year. Let  $f(t)$  be the number of frogs in the forest  $t$  years after 2000.

i) [3 points] Find a formula for  $f(t)$ , assuming the decay rate of the population of frogs continues at the same percent rate per year.

$$\boxed{\text{Solution: } f(t) = 2500(.938)^t}$$

ii) [1 points] How many frogs are in the forest in 2008? \_\_\_\_\_

$$\boxed{\text{Solution: } f(8) = 2500(.938)^8 \approx 1498.18 \text{ (or 1498 frogs).}}$$

- b. [5 points] In the same forest there is a population of 1400 birds on the first day of October. Winter is arriving, and the birds are migrating to a warmer place. Every day, 25 birds leave the forest. Let  $B = b(d)$  be the number of birds left in the forest,  $d$  days after October 1st.

i) [2 points] Find a formula for  $b(d)$ .

$$\boxed{\text{Solution: } b(d) = 1400 - 25d.}$$

ii) [3 points] Find and give a practical interpretation of the horizontal intercept of the graph of  $B = b(d)$ .

Horizontal intercept= \_\_\_\_\_

Practical interpretation:

$$\boxed{\text{Solution: Horizontal intercept: } b(d) = 0, \text{ then } d = \frac{1400}{25} = 56.}$$

**Practical interpretation:** It takes 56 days after Oct 1st for all the birds to leave the forest.