

### Answer on Question #57020 – Math – Algebra

1. A lake is stocked with 1,500 young trout. If the number of the original trout alive after  $x$  years is given by the function  $P(x) = 1,500 e^{-0.4x}$ , when will there be 300 of the original trout left?

#### Solution

$$P(x) = 1,500 e^{-0.4x}$$

If  $P(x)=300$ , then

$$1,500 e^{-0.4x}=300,$$

$$e^{-0.4x}=1/5,$$

$$-0.4x=\ln(1/5),$$

$$-0.4x=-1.609,$$

$$x = 4.023 \text{ years}$$

**Answer:** 4.023 years.

2. A hot bowl of soup cools accordingly to Newton's law of cooling. Its temperature (in degrees Fahrenheit) at time  $t$  is given by  $T(t) = 68 + 144e^{-.04t}$ , where  $t$  is given in minutes.

(i) What was the initial temperature of the soup?

(ii) What was the temperature of the soup after 15 minutes?

(iii) How long after serving is the soup 125 Degrees F?

#### Solution

$$T(t) = 68 + 144e^{-.04t},$$

(i) Initial temperature of the soup ( $t=0$ ) was  $T(0) = 68 + 144 = 212^{\circ}$  F.

(ii) Temperature of the soup after 15 minutes was

$$T(15) = 68 + 144e^{-.04 \cdot 15} = 68 + 144 \cdot 0.5488 = 147.03^{\circ} \text{ F.}$$

(iii) How long after serving is the soup 125 Degrees F?

$$125 = 68 + 144e^{-.04t},$$

$$144e^{-.04t} = 57,$$

$$e^{-.04t} = 0.3958,$$

$$-.04t = \ln 0.3958,$$

$$-.04t = -0.9268,$$

$$t = 23.17 \text{ min}$$

**Answer:** (i)  $212^{\circ}$  F; (ii)  $147.03^{\circ}$  F; (iii) 23.17 min.