Math 181
Name:
March 27, 2008

Solution

QUIZ # 9

1. (*5 points*) Suppose a population of deer in a certain forest satisfies that, when there are P deer one year, then the following year the population is

$$1.5P - 0.0005P^2$$

deer. The local bureau of forestry wants to manage the deer population for the benefit of hunter. What is the maximum sustainable harvest?

Sol: Note $F(P) = 1.5P - 0.0005P^2$. Then.

$$F(P) = P + 0.5P - 0.0005P^2 = P + 0.5P(1 - 0.001P)$$

So that $k = 0.5$ and $\alpha = 0.001$. Then.

$$H(P)_{max} = \frac{k}{4\alpha} = \frac{0.5}{4\times 0.001} = \frac{5}{4\times 0.1} = 125.$$

□

2. (*10 points*) Fill in the blanks:

(i) $2^3/2^{-2} =$ $2^3 \cdot 2^2 = 2^5 = 32$

(ii) $(4^2)^{1/2} =$ $4^{2\cdot 1/2} = 4$

(iii) $\log_2^{32} =$ $\log_2 2^5 = 5$

(iv) $\ln^{e^{2/3}} =$ $\ln e^{2/3} = 2/3 \ln e = 2/3$

(v) $3^{\log_3^5} - \log_3^{3^5} =$ $5 - 5 = 0$

3. (*5 points*) Solve equation $4\log(x) + 6 = \log(x)$

Sol: $6 = \log x - 4\log x = \log(x/x^4) = \log x^{-3}$

$\Rightarrow 10^6 = x^{-3} \Rightarrow 10^2 = x^{-1} \Rightarrow x = 100^{-1} \Rightarrow x = 0.01$

$(x = 10^{-2})$