

Homework 6

Additional problems

due October 7, 2014

In addition to

2.9: 2, 6, 16, 28, 38, 44, 48

3.1: 10, 22, 26, 38, 42, 96, 98

3.2: 10, 14, 26, 30, 46, 106, 108, 110, 112

complete the following problems.

Note: When doing these problems, sketching can be helpful, even when it's not explicitly required.

1. The function $f(x)$ is given by $y = f(x) = x^5 - 10kx^4 + 25k^2x^3$, where k is a positive constant.

(a) Find all the intervals on which $f(x)$ is either increasing or decreasing. Determine all relative (local) maxima and minima.

(b) Determine intervals on which the graph is either concave up or concave down. What are the inflection points of $f(x)$.

2. The population of a flock of geese is modeled by

$$G(t) = 2000 + 150 \sin\left(\frac{\pi}{6}t\right) + 75 \sin\left(\frac{\pi}{3}t\right),$$

where t is measured in months from January 1.

(a) Find any critical points and any inflection points of $G(t)$. State the location of any relative (local) maxima, minima, and inflection points. Use this information to sketch a graph of $G(t)$ over a 2-year period.

(b) Interpret any local maxima, minima, and inflection points over the first two years in biological terms.

(c) How fast is the flock growing on May 1? On May 1, is the rate at which the flock is growing increasing or decreasing?