MAT 17A - DISCUSSION #7

Dose-Response of Multi-Vitamins

Multi-vitamins typically have dose-response curves of the following form

$$R = f(x) = \frac{ax}{k^2 + x^2}, \quad x \geq 0,$$

where x is a measure of the daily dose, R is a measure of the health benefits, and a and k are positive constants.

(a) According to this model what is the health benefit to taking no vitamins?

(b) What happens if you take an extremely large dose?

(c) What is the range of dosage where taking more will increase the benefit, and what is the range of dosage where taking more will decrease the benefit?

(d) Is there ever a negative benefit to taking the vitamins, according to this model?

(e) Is there a dosage that maximizes the health benefits? If so, find the dosage, and find the maximum helth benefit.

(f) Is there a dosage that minimizes the health benefits? If so, find the dosage, and find the minimum health benefit.

(g) Graph the function using the information from the previous parts and interpret your graph in terms of the health benefits of the multi-vitamins.