

Math 104 section 108 Homework week 7

Daniel Rakotonirina

October 27, 2017

First Name: _____ Last Name: _____

Student Number: _____

Exercise 0.1. A spotlight on the ground shines on a wall $15m$ away. If a woman $2m$ tall walks from the spotlight toward the wall at a speed of $0.7m/s$, how fast is the length of her shadow (on the building) changing when she is $8m$ from the building? State your answer accurate to 2 decimal places. (1.5 marks)

Exercise 0.2. You borrow 10 thousand dollars from Nick the Shark, who charges you at a fixed rate r that is compounded continuously. If you pay Nick 100 thousand dollars 2 years later, what was the annual rate of interest that he charged? (A calculator-ready form will suffice.) (1.5 marks)

Exercise 0.3. Let $f(x) = \frac{e^x}{x^2}$ (4 marks)

1. Find the critical point of $f(x)$.
2. Find the intervals on which f is increasing or decreasing.
3. Find $f''(x)$.
4. Find the nature of the critical points.

Exercise 0.4. Opad, the blockbuster product of Opplé Inc., has a weekly demand q that declines with price p according to $q = 1000e^{-p/200}$. (3 marks)

1. Find the elasticity of demand ε at the current price of \$100.
2. Use the elasticity of demand to calculate the marginal revenue at the current price of \$100. Simplify your answer to "calculator ready".
3. If the price is raised by 1%, use the elasticity to estimate the percentage decline in sales.