

MATH 210: 10-18 WORKSHEET

You work as an analyst for a nonprofit providing legal aid to unhoused people, advising on how best to direct the organization's resources. This quarter you have a budget of \$100,000 (after fixed administrative costs) to direct. The money can either be directed toward legal aid or toward fundraising to raise additional money for the nonprofit. Your model tells that you that spending x dollars on fundraising will have a return of

$$r(x) = 80,000 - 20,000e^{\ln 4 - 0.0001x},$$

which can immediately be put into legal aid.

How much of your budget should you direct toward fundraising in order to maximize the amount that can be spent on legal aid? What amount does that give you to spend on legal aid? Give both an exact answer and round to the nearest dollar.

After finishing your calculations: The real world is not so pristine as a word problem in a mathematics classroom. What are some real world complications this simplified picture overlooked?

You work for an animal rescue. Part of your job is to construct enclosures for cats rescued off the street. You are limited in both budget and space. An enclosure must be a one foot deep rectangular box, but you can choose the width and height. If you have a budget of \$100 per box, the floor material costs \$5 per square foot, the ceiling material costs \$3 per square foot, and the wall material costs \$4 per square foot then what is the largest volume you can obtain for the enclosure? What dimensions give this volume?

After finishing your calculations: The real world is not so pristine as a word problem in a mathematics classroom. What are some real world complications this simplified picture overlooked?