

MA 224 - Quiz 9 Practice Problems

Feel free to work on these with classmates. These are just practice problems to help you gauge how comfortable you are with the material—completely optional. The quiz will not be this long.

Note that this doesn't necessarily cover all the topics that the quiz can cover: it is intended to be just a review of a couple key things.

1. Purdue is going to construct a rectangular building, with three extra walls on the inside to make extra rooms: 2 run north and south, and 1 runs east and west. They know they want the floor area to be 1200 square meters. They are using expensive siding on the walls, and want to know what dimensions the floor should be to minimize the total cost of construction, if all the walls are 3 meters high.
2. A laboratory discovered a chemical compound that makes people happy, if its component chemicals are combined in the optimal proportions. They find through experimentation that, if x grams of substance X are used, and y grams of substance Y are used, then the positive effect on the human brain is $P(x, y) = 55 (0.6x^{-1/4} + 0.4y^{-1/4})^{-4}$, subject to the constraint $2x + 5y = 150$. What amount of X and Y should be used?
3. A soda can can holds 6.89π fluid ounces (12 ounces). What are the dimensions of a soda can that takes the least amount of material to construct?

Answers

Keep in mind there are other CORRECT ways to express these answers, but the answers I provide are likely to be the way the answers would appear on an exam.

1. $x = 30, y = 40$ (meters)
2. The maximum occurs at $(40,14)$ (the max is ≈ 1398).
3. $r = 1.51, h = 3.02$