Midterm 2 Practice

Math 111

Exercise 1: The function $P(r) = \dfrac{100r^2 - 50r - 50}{r^2 + 100}$, is an (inaccurate) model for the percent of customers who will prefer Starbucks to all other coffee shops when Starbucks spends r million dollars on marketing.

a) Find and interpret $P(5)$.

b) What is the mathematical domain of P?

c) What is the practical domain? Note that $P(r)$ is not always positive.

d) What is the behavior of P as $r \longrightarrow \infty$? As $r \longrightarrow -\infty$? Interpret each or explain why it's not meaningful.

Exercise 2: A heater requires $H(t) = (90 - t)^2$ Watts of power to keep my office at a constant 90 degrees when the outside temperature is t degrees. Then I open the window, and the room starts to cool down. Its temperature m minutes after I open the window is $T(m) = 90 - \sqrt{2m}$.

a) How can we combine H and T to create a function that gives the power the heater uses, m minutes after the window is opened? Find and simplify a formula.

b) What is the mathematical and practical domain of the function from part a)?

c) H is *almost* the inverse function to T. What should the actual inverse be?