MATH 220, QUIZ 8 DUE THURSDAY MARCH 30 SHOW ALL WORK

Bob, who manages Gil's Bookstore, determines that if a new paperback edition of *One Hundred Years of Solitude*, by Gabriel Garcia Marquez, is priced at p dollars per copy, the daily demand is $q = 300 - p^2$ copies.

a. What is the domain of this function? Though a polynomial has a domain of the reals, a demand function is restricted to those $p \geq 0$, and such that $q \geq 0$. But the graph of $q = 300 - p^2$, it's obvious by the roots that this occurs where:

$$0 \leq p \leq \sqrt{300}$$

b. Write the elasticity function for this scenario. Important: p is the input variable. Leave as p. $q(p)$ is the given demand function.

$$E(p) = \frac{-p}{q(p)} \cdot \frac{dq}{dp} = \frac{-p}{300-p^2} \cdot -2p = \frac{2p^2}{300-p^2} \text{ done}$$

c. If the price were increased slightly from \$8, would revenue increase or decrease? Explain.
$E(8) = 128/236 < 1$, hence demand is inelastic at \$8, thus, *revenue would increase* with a small increase in price. This is obvious as well from the relationship between E and R':

$R'(p) = q(1 - E) > 0$ when $E < 1$. The derivative is positive where the fcn isincreasing.

d. What price would bring maximum revenue for this paperback (that is, the optimal price)?

$$\frac{2p^2}{300-p^2} = 1, \; p = \$10$$

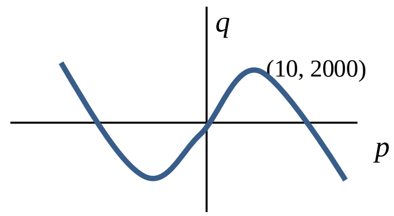
e. How many books would Bob sell at the price you found in (d)?

$q(10) = 300 - 100 = 200$ books

f. Draw a graph of the *revenue function* for this scenario. Label ordered pair the point at which the revenue is maximum.

First, find $R(p)$: $R = pq = p(300 - p^2) = 300p - p^3$

As a little review in curve sketching, consider that the polynomial's end behavior and its roots:



We consider only the portion in the first quadrant.