

The demand,  $D$ , for a new rollarball pen is given by

$$D(p) = 0.336p^3 - 2400p^2 + 72000p, \quad 0 \leq p \leq 30$$

where  $p$  is the price in dollars. Demand represents the total number of pens the consumers want to buy at price  $p$ .

1. How many pens will the consumers want to buy when the price is \$25 per pen?
2. Find the rate of change of quantity with respect to price, i.e.,  $D'(p)$ .
3. Find the rate of change at  $p = 25$ .
4. Using only your answers from (1) and (3), estimate the demand for pens when the price increases by \$1? Estimate the demand if the price decreases by \$1.
5. Assuming the only critical value for  $D'(p)$  in the interval  $[0,30]$  is \$15, what should the price be per pen to maximize the demand. In other words, find the absolute maximum.