

3. Suppose $q(p) = 500 - 2p$ units of a product are demanded when price is p dollars per unit.

(a) Calculate the elasticity of demand when $p = 200$. At this price, is the demand elastic or inelastic?

(b) Write a sentence explaining the meaning of your answer in (a). Be as specific as possible.

(c) Give an example of a product in this price range that might behave this way.

4. Sketch a nice BIG graph of a function with all the properties listed below. Make sure your graph is clearly labeled.

(a) $f'(x) > 0$ when $x < 1$, but $f'(x) \leq 0$ otherwise

(b) $f''(x) > 0$ when $x < -1$ and when $-1 < x < 0$, but $f''(x) \leq 0$ otherwise

(c) $f(x)$ is undefined when $x = -1$

(d) $\lim_{x \rightarrow -\infty} f(x) = -2$.

5. A retailer has purchased several cases of imported wine as an investment. As the wine ages, its value initially increases, but eventually the wine will pass its prime and its value will decrease. Suppose that x years from now, the value of a case will be *changing at a rate* of $53 - 10x$ dollars per year. Suppose in addition that storage rates for the cases of wine stay the same at \$3 per case per year. When should the retailer sell the wine in order to make the most profit?

6. Find the equation of the line tangent to the graph of $x^2y - 2xy^3 + 6 = 2x + 2y$ at the point $(0,3)$.

7. Find the absolute minimum and absolute maximum *points* of $f(x) = (x^2 - 4)^3$ on the interval $[-3, 1]$.

8. Find $f'(x)$ for the following functions. DO NOT simplify!

(a) $f(x) = \left(x + \frac{1}{x}\right)^2 - \frac{5}{\sqrt{3x}}$

(b) $f(x) = \frac{(3x+1)^3}{(1-3x)^4}$