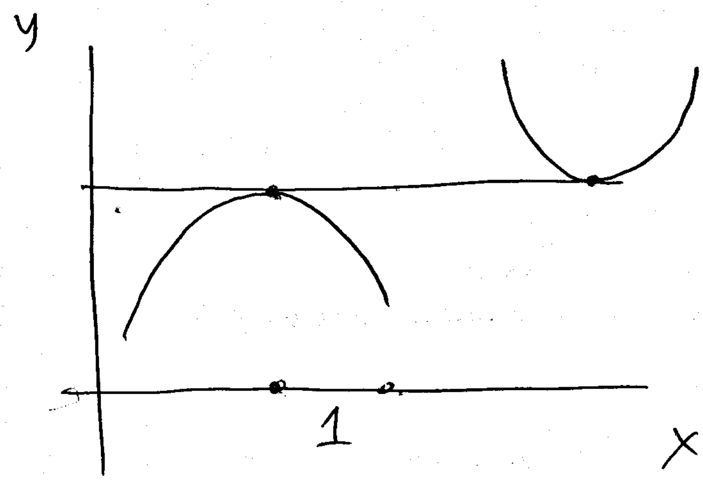
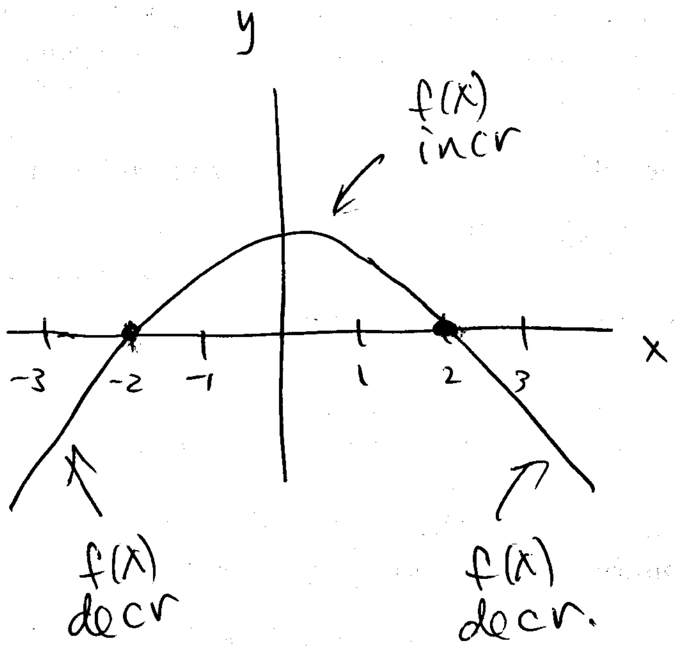



slope = 0

3.1

1)

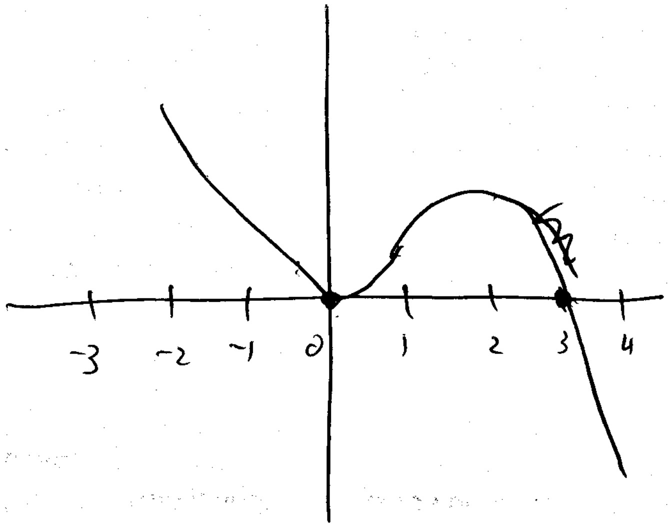



f'(x)

f(x) decreasing on $(-\infty, -2) \cup (2, \infty)$

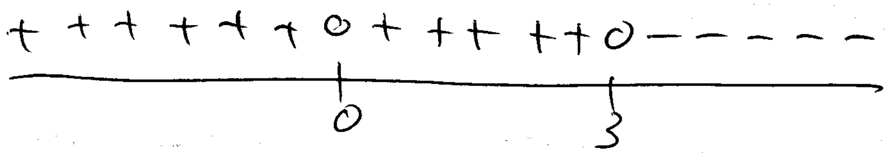
increasing on $(-2, 2)$

2)

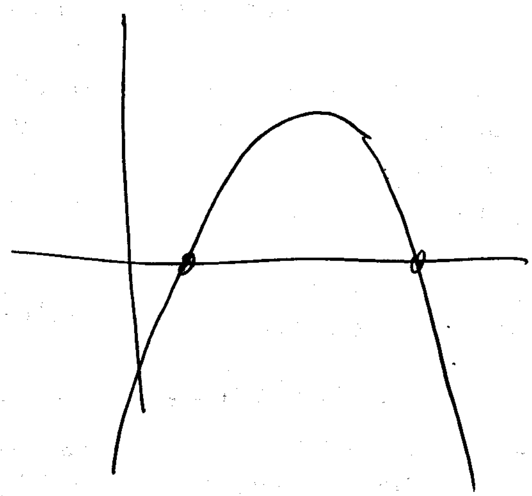



$f'(x)$

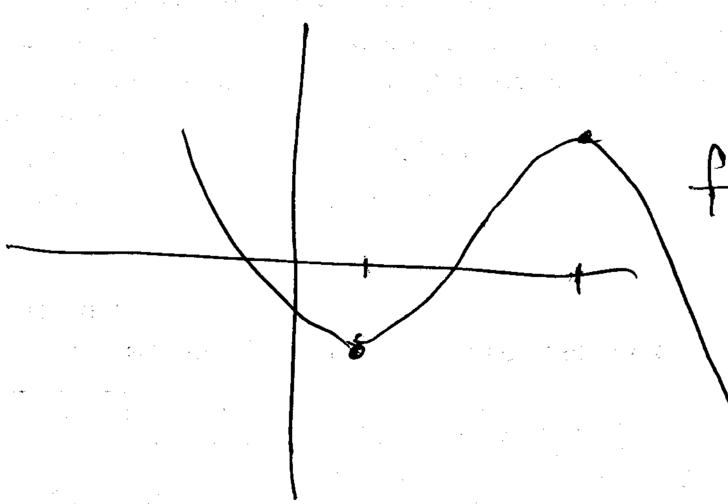
$f'$




(A)



$f'$



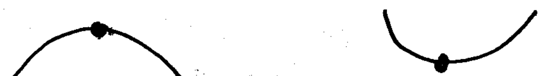
$f$

e.g.

3.4 4) $f(x) = x^5 - 5x^4 + 1$ $\quad 0 \le x \le 5.$

Find absolute max & min of $f(x)$

We ~~ka~~ know how to find relative max & min



rel. max rel min.

1. Find all relative extrema in $[0,5]$
2. Check end points.

$f'(x) = 5x^4 - 20x^3$

$5x^4 - 20x^3 = 0$

$5x^3(x-4) = 0$

$x = 0 \quad x = 4 \leftarrow$ crit #s

$f(0) = 1 \quad f(4) = 4^5 - 5\cdot 4^4 + 1$

$= -256 + 1 = -255$

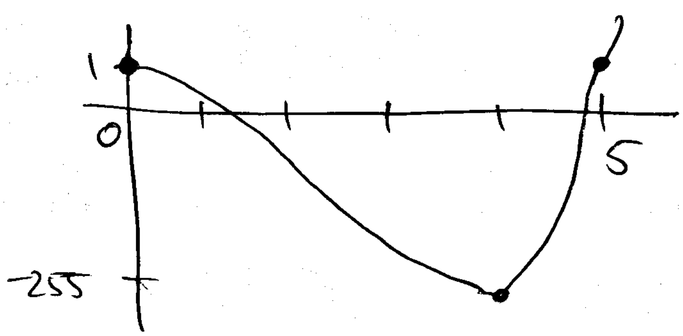
$f(0) = 1$

$f(5) = 5^5 - 5\cdot 5^4 + 1$

$= 1$

Absolute max is 1 at $x=0$ and $x=5$

Absolute min is $-255$ at $x=4$



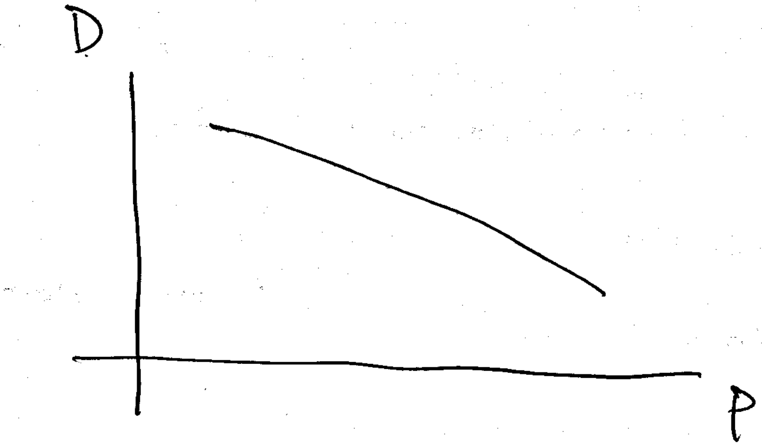
# Elasticity of Demand.

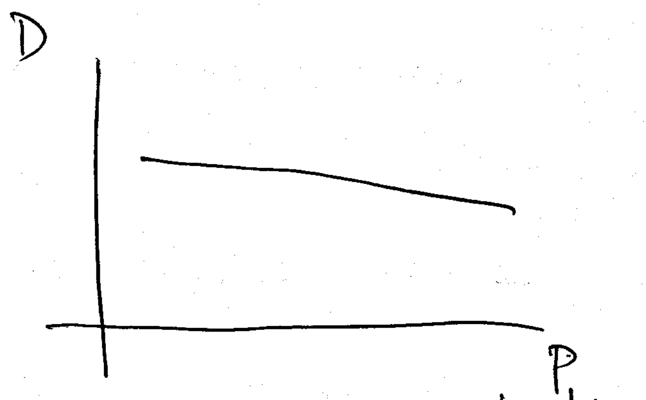
Idea: Interpretation of the derivative

$D(p)$ – demand function

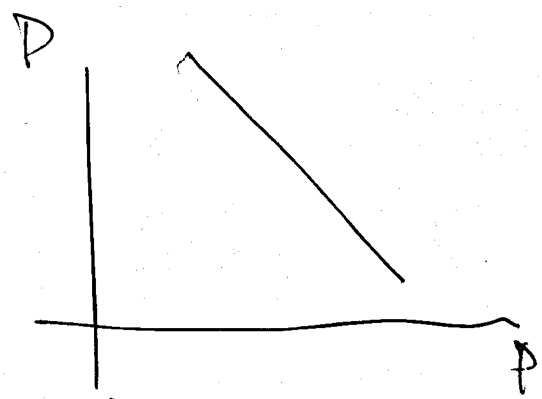
$p$ – price

$D$ – # units you will sell at that price




flat curve → inelastic demand.

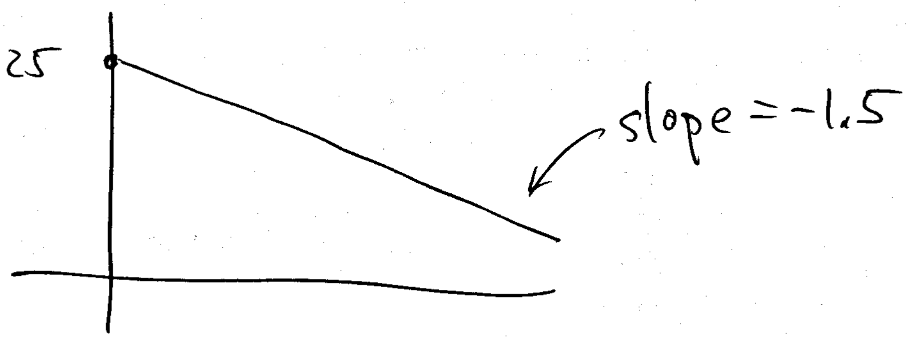



steep curve → elastic demand.

Write $q = D(p)$

$$E(p) = \frac{p}{q}\frac{dq}{dp} = \frac{p}{D(p)} D'(p)$$

#24) $D(p) = -1.5p + 25$ $\qquad \underline{p = 12}$




$$D'(p) = -1.5$$

$$E(p) = \frac{p}{D(p)} D'(p) = \frac{p(-1.5)}{-1.5p+25} = \frac{-1.5p}{-1.5p+25}$$ //

$$E(12) = \frac{(-1.5)(12)}{(-1.5)(12)+25} = \frac{-18}{-18+25} = \frac{-18}{7}$$

$|E(12)| = \frac{18}{7} \approx 2.6$ elastic.

#18) $p(q) = 37 - 2q$ ← price at which $q$ units are sold

$C(q) = 3q^2 + 5q + 75$ ← cost of producing $q$ units

$R(q) = q \cdot p(q) = q(37 - 2q)$

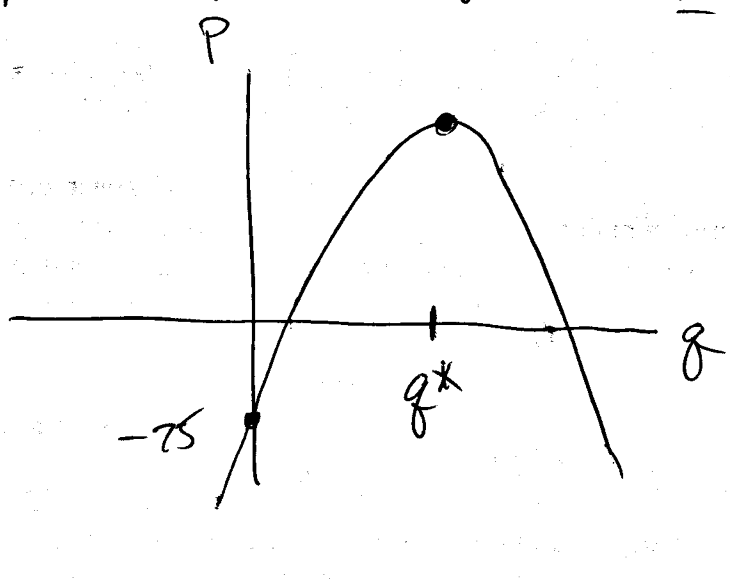
revenue generated by producing + selling $q$ units.

$P(q) = R(q) - C(q) = q(37-2q) - (3q^2 + 5q + 75)$

profit realized by producing + selling $q$ units

$= 37q - 2q^2 - 3q^2 - 5q - 75$

$= -5q^2 + 32q - 75$




Find $q^*$:

$P'(q) = -10q + 32$

$-10q + 32 = 0$

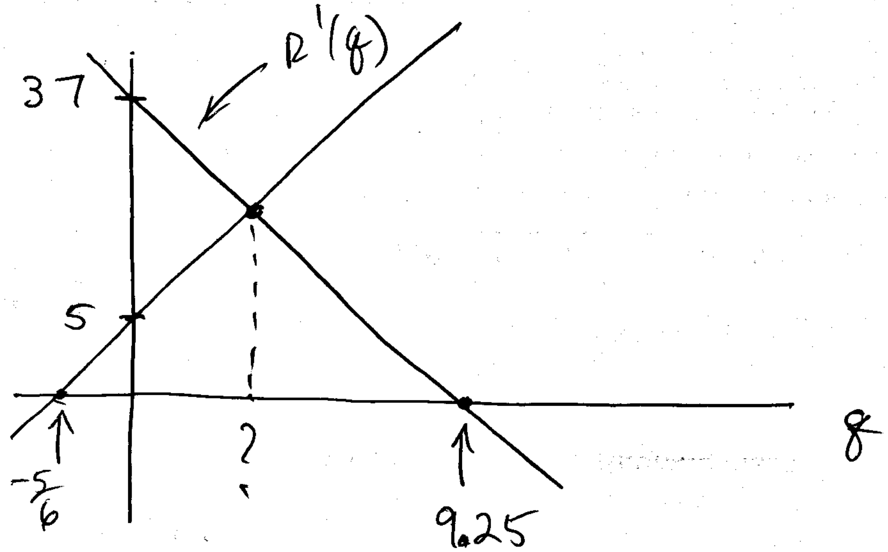
$q = 3.2$ units

$R(q) = 37q - 2q^2$

$R'(q) = 37 - 4q \leftarrow$ marginal revenue

$C(q) = 3q^2 + 5q + 75$

$C'(q) = 6q + 5 \leftarrow$ marginal cost.




$37 - 4q = 6q + 5$

$32 = 10q$

$3.2 = q$

#33) $x$ – # years after 1993

$P$ – # members

$$P(x) = 100(2x^3 - 45x^2 + 264x)$$

(a) $1995 \longleftrightarrow x = 2$

$2008 \longleftrightarrow x = 15$

Find $x$ for which $P(x)$ is largest / smallest with $2 \le x \le 15$

$$P'(x) = 100(6x^2 - 90x + 264)$$

Set $P'(x) = 0$ ~~stave~~ solve.

$$6x^2 - 90x + 264 = 0$$

$$6(x^2 - 15x + 44) = 0$$

$$6(x - 11)(x - 4) = 0$$

$x = 11 \quad x = 4 \longleftarrow$ crit #s

$P(4) \quad P(11) \quad P(2) \quad P(15)$ check these