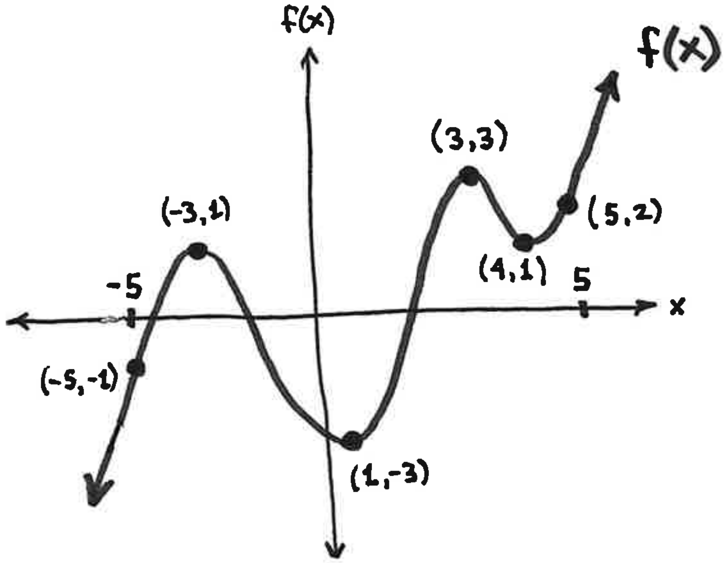
MATH 1325
Chapter 12.3: Optimizations Applications



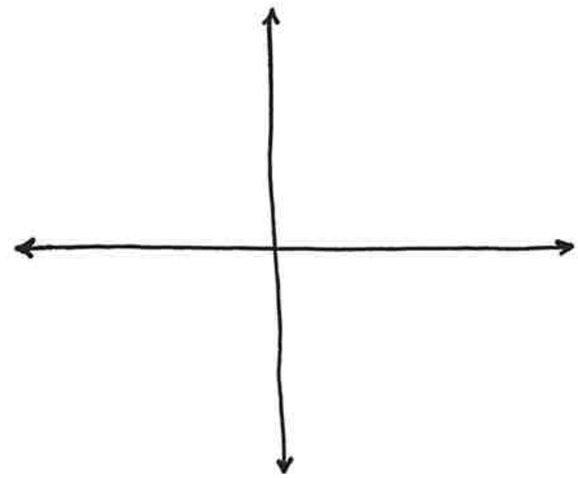
GIVEN $f(x)$, FIND THE ABSOLUTE MINIMUM AND ABSOLUTE MAXIMUM OVER THE INTERVAL $[-5, 5]$.

EXTREME VALUE THEOREM

A CONTINUOUS FUNCTION $f(x)$ OVER $[a,b]$ HAS AN ABSOLUTE MINIMUM AND ABSOLUTE MAXIMUM IN $[a,b]$; BOTH OCCURING AT EITHER a, b, OR A CRITICAL VALUE OF $f(x)$.

FIND THE ABSOLUTE EXTREMA OF $f(x) = 4x + \frac{36}{x}$ ON $[1,6]$.

Find the absolute extrema of $f(x) = \dfrac{x}{(x+2)(x-3)}$ over $(-2,3)$.



Critical-Point Theorem

A continuous function $f(x)$ over interval I has exactly one critical point C:

Local maximum C is absolute maximum of $f(x)$ over I.

Local minimum C is absolute minimum of $f(x)$ over I.

Consider $f(x) = x^3 - 3x + 1$.
Show $f(x)$ has an absolute minimum on $(0,2)$.

AN OPEN BOX IS TO BE MADE BY CUTTING A SQUARE FROM EACH CORNER OF A 12" BY 12" METAL SQUARE AND FOLDING THE SIDES. IF THE BOX MUST BE BETWEEN 1.5" AND 3" DEEP, DETERMINE THE SIZE OF THE SQUARES TO CUT TO MAXIMIZE THE VOLUME OF THE BOX.

IF A CLOSED BOX HAS A LENGTH PLUS GIRTH OF NO MORE THAN 108" WITH EQUAL WIDTH AND HEIGHT LENGTHS, FIND ITS DIMENSIONS TO MAXIMIZE THE VOLUME.

LAND ON A FARM IS TO BE FENCED ON 3 SIDES (ONE SIDE HAS BEEN FENCED) WITH A 20 ft OPENING IN FRONT. IF THE FENCE ALONG THE FRONT (PARALLEL TO THE SIDE ALREADY FENCED) IS \$30 PER FOOT AND \$10 PER FOOT FOR THE OTHER SIDES, FIND THE MAXIMUM AREA WHICH CAN BE FENCED FOR \$5400.