Graph the following function by hand by making a first derivative sign diagram and then a second derivative sign diagram.

#1) $f(x) = x^2(x^2 - 4)$
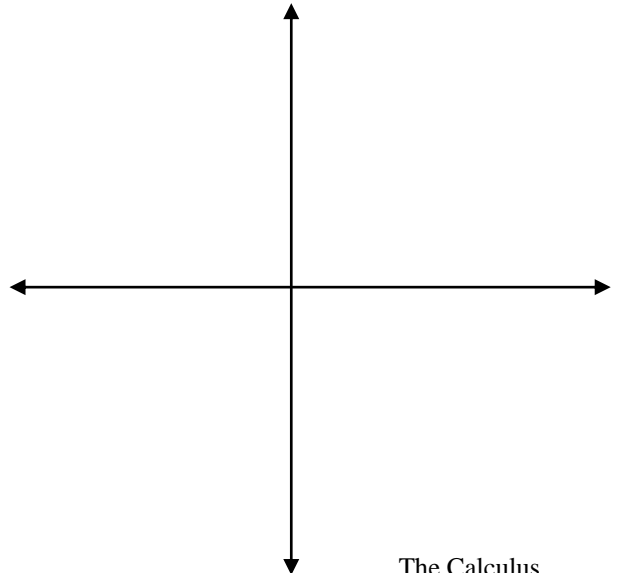
Graph the following function by hand by making a first derivative sign diagram and then a second derivative sign diagram.

#2) $f(x) = \dfrac{10x^2}{x^2-9}$

Graph the following function by hand by making a first derivative sign diagram and then a second derivative sign diagram.

#3) $f(x) = x^3 + 3x^2 + 3x + 6$

Graph the following function by hand by making a first derivative sign diagram and then a second derivative sign diagram.
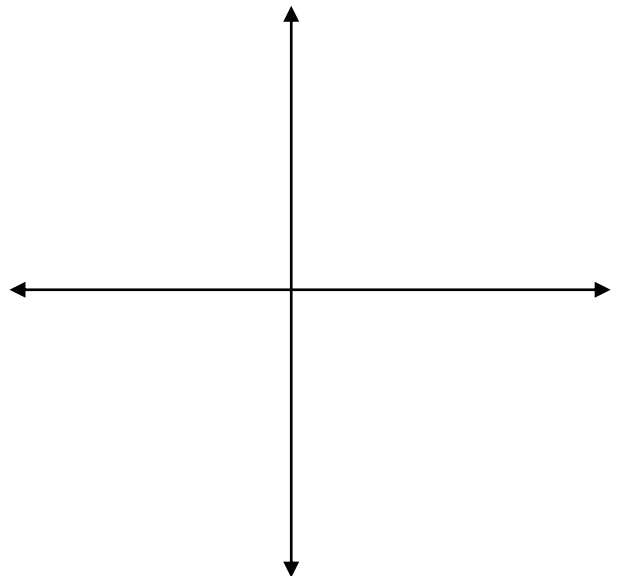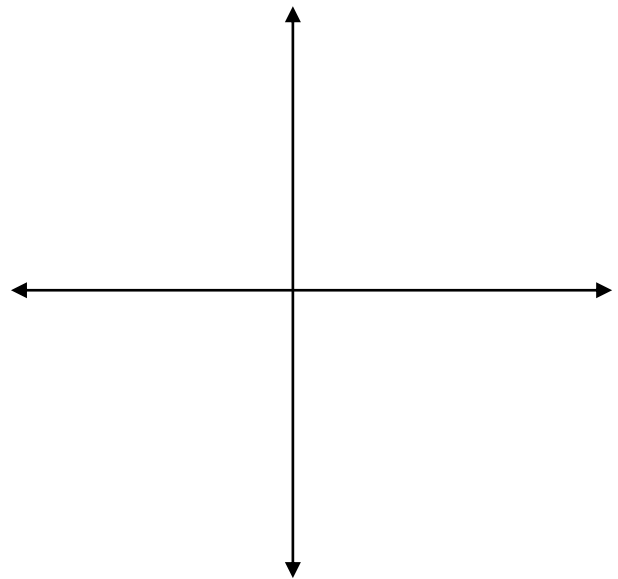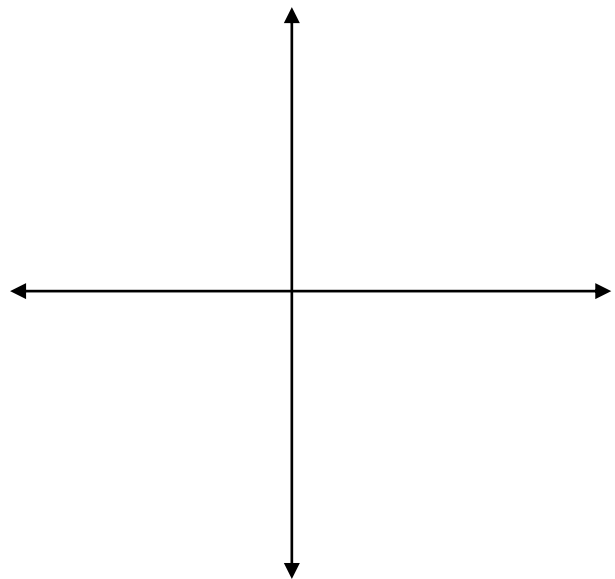
#4) $f(x) = x^3(x - 4)$

Find the absolute extreme points of each function on the given interval.

#5) $f(x) = x^3 - 6x^2 + 22$ on [-2, 2]

#6) $f(x) = x^4 - 4x^3 + 4x^2$ on [0, 3]

Absolute Max:

Absolute Min:

Absolute Max:

Absolute Min:

#7) The fuel economy of an average compact car in Gnaden is $E(x) = -0.015x^2 + 1.14x + 8.3$, where x is the driving speed (in miles per hour $20 \leq x \leq 60$). At what speed is fuel economy the greatest? What is the greatest mpg?

#8) Two Wheel Deals finds that it costs $70 to manufacture each bicycle, and fixed costs are $100 per day. The price function is $p(x) = 270 - 10x$, where p is the price (in collars) at which exactly x bicycles will be sold. Find the quantity Two Wheel Deals should produce and the price it should charge to maximize profit. Also find the maximum profit.

Quantity that should be produced =
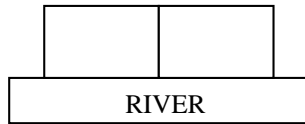
Price to be sold =

Maximum Profit =

Sentence Answer

Sentence Answer

#9) A farmer wants to make two identical rectangular enclosures along a straight river, as in the diagram shown below. If he has 600 yards of fence, and if the sides along the river need no fence, what should be the dimensions of each enclosure if the total area is to be maximized?

RIVER

Side parallel to the river of one enclosure =

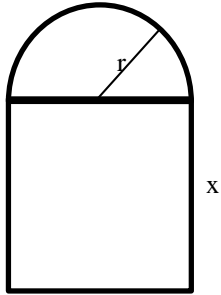Side perpendicular to the river of one enclosure =

Total Maximized Area =

Sentence Answer

#10) If the perimeter of the window below is to be 18 feet, find the dimensions (x and r) that maximize the area of the window. (hint: The perimeter is 3 sides of a rectangle and half a circle.)

$x =$

$r =$

Total Maximized Area =

Sentence Answer: