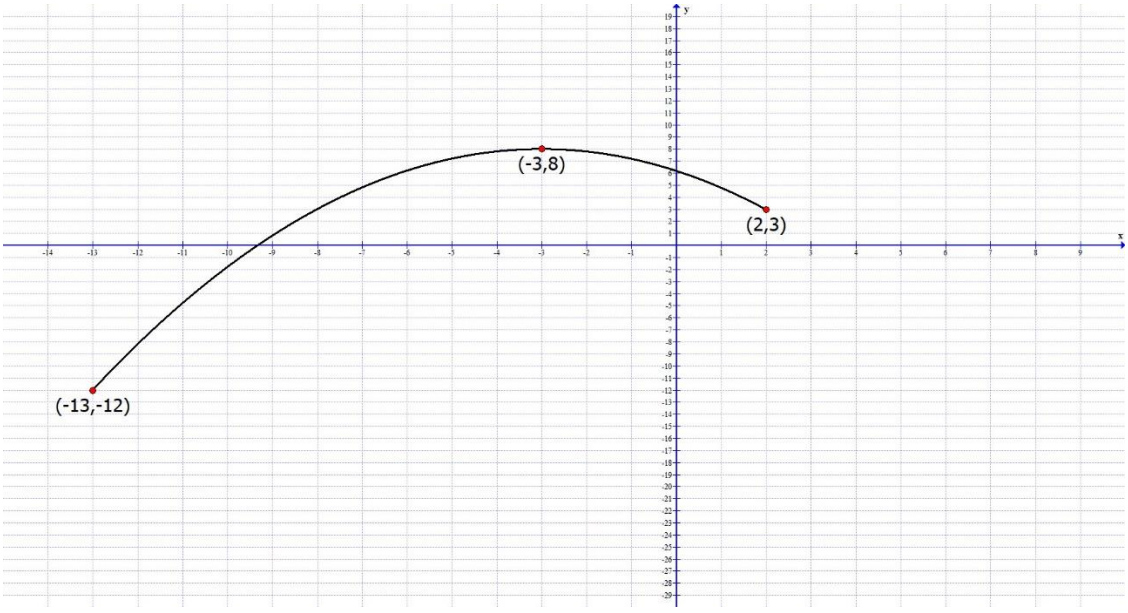
Grima MAT 212
Chapter 4 extra practice test

1) Find the absolute maximum and absolute minimum.



2) Use implicit differentiation to find $\frac{dy}{dx}$: $12y^2 - 3y = 8x^2$

3) Use implicit differentiation to find $\frac{dy}{dx}$: $xy = 4x - 9$

4) Find the absolute maximum and absolute minimum of the function under the given interval.

$f(x) = 8x^2 - 48x - 6; \quad [-6, 4]$

5) Find the absolute maximum and absolute minimum of the function under the given interval.

$f(x) = 7xe^x \quad [-2,3]$

(write answer using e's where appropriate, points will be deducted for decimal answers)

6) Find the equation of the line tangent to the graph at the indicated point.

$y^2 = 3x^2 + 6x + 7; \quad (1,4)$

7) A pebble is dropped into a calm pond causing ripples in the form of concentric circles. The radius *r* of the outer ripple is increasing at a constant rate of 2 feet per second. When the radius is 5 feet, at what rate is the total area of the disturbed water changing? Leave your answer in terms of π. (Area of a circle $A = \pi r^2$)

8) Air is being pumped into a spherical balloon at 10 cm^3/minute. Calculate the rate at which the radius of the balloon is changing when the radius of the balloon is 4 cm. Hint volume of a sphere can be found using the formula $V = \frac{4}{3}\pi r^3$ Leave your answer in terms of π.

9) A campground owner has 1200 meters of fencing. He wants to enclose a rectangular field bordering a river, with no fencing needed along the river, and let W represent the width of the field and L represent the length of the field. Make W be the side of the fence that is perpendicular to the river so that two widths and one length will need to be constructed.

a) Write an equation for the length of the field

b) Write an equation for the area of the field.

c) Find the domain of the area equation that was created in part b.
(This domain will be of the form: $0 \leq Width \leq some\ number$)

d) Find the value of the width leading to the maximum area.

e) Find the value of length leading to the maximum area.

f) Find the maximum area that can be enclosed.

Answers

1) There is an absolute maximum of $y = 8$ which occurs when $x = -3$
There is an absolute minimum of $y = -12$ which occurs when $x = -13$

2) $\frac{dy}{dx} = \frac{16x}{2y-3}$

3) $\frac{dy}{dx} = \frac{-y+4}{x} or \frac{-1(y-4)}{x} or \frac{4-y}{x} or -\frac{y}{x} + \frac{4}{x}$

4) There is an absolute maximum of $y = 314$ which occurs when $x = 4$
There is an absolute minimum of $y = -78$ which occurs when $x = -3$

5) There is an absolute maximum of $y = 21e^3$ which occurs when $x = 3$
There is an absolute minimum of $y = -\frac{7}{e}$ which occurs when $x = -1$

6) $y = \frac{3}{2}x + \frac{5}{2}$

7) Area is increasing at $20\pi\ ft^2/sec$

8) Radius in increasing by $\frac{5}{8\pi}\ cm/min$

9a) $l = -2w + 1200$

9b) $A = -2w^2 + 1200w$

9c) $0 \leq w \leq 600$

9d) $width = 300\ meters$

9d) $length = 600\ meters$

9e) $area = 180000\ m^2$