## Math 221 Worksheet 16 October 27, 2020 Sections 3.7: Optimization; Section 3.9: Antiderivatives

1.	. Show that, of all the rectangles with a given perimeter, the one with the greatest area is a square.
2.	. Suppose you're building a 300 foot fence to enclose a rectangular plot of land. A building adjoins one side of the plot, while the fence should make up the other three sides. What's the largest amount of land that you can enclose

3. For each of the following functions, find all antiderivatives:

(a) 
$$f(x) = 4x + 3$$

(b) 
$$f(x) = 4\sin(x) + \sec^2(x)$$

(c) 
$$f(x) = \sqrt{x} - 2x^{-3} + (x-3)^2$$
.

(d) 
$$f(x) = \sin(x)\cos(x)$$

4. Use the given information to determine the function f:

(a) 
$$f'(x) = 3x^2 + \sin(2x)$$
 and  $f(0) = 5/2$ 

(b) 
$$f''(x) = 35x^{3/2} - 9\sin(3x)$$
 and  $f'(0) = 11$ ,  $f(0) = -5$ .

(	(c)	f'''	'(x)	$=\cos($	$(x)$ $\epsilon$	and j	f(0)	= 1,	f'(0)	= 2,	f''(0)	= -3

5. A squirrel climbs a thin vertical tree trunk. Suppose that, when t seconds have passed, the squirrel's velocity is  $v(t) = t^3 - 12t^2 + 35t$  feet per second. What is the squirrel's displacement after 8 seconds?

6. Suppose you have \$1000 to spend on fencing a rectangular plot of land with sides parallel to the cardinal directions. If the east and west sides of the plot cost \$10 per foot to fence and the north and south sides cost \$5 per foot, what is the largest amount of land you can enclose?

7.	Which point on the parabola	a defined by $y = x^2$ is closest t	to the point $(3,0)$ ?