Math 12
Vogler
Extra Credit Maximum and Minimum Problems

RULES: The first person to post the answer to any of these problems on the chat room will receive +3 extra credit on Exam 2. If you believe the answer to problem 1 is 5 ft, then you write ON THE CHATROOM "Answer to 1: 5 ft" (Note: correct units MUST be stated to receive credit). For decimal answers, include at least three decimal places. You may submit as many answers as you wish, BUT every student can only receive this bonus ONCE on exam 2. Once you become the first to answer a question right, then it withdraws all your future answers (right or wrong) for extra credit points.

1.) If a football is kicked straight up with an initial velocity of 128 ft/sec from a height of 5 ft. What is the maximum height?

2.) If a juggler can toss a ball straight up into the air at a velocity of 64 ft/sec from a height of 6 ft, then what is the maximum height reached by the ball?

3.) If an archer shoots an arrow straight upward with an initial velocity of 160 ft/sec from a height of 8 ft, then what is the maximum height reached by the arrow?

4.) If a soldier in basic training fires a rocket propelled grenade (RPG) straight up from ground level with an initial velocity of 256 ft/sec, then what is the maximum height reached by the RPG?

5.) Shondra wants to enclose a rectangular garden with 200 yards of fencing. What dimensions for the garden will maximize its area?

6.) Chantel wants to make a rectangular frame for a mirror using 10 feet of frame molding. What dimensions will maximize the area of the mirror assuming that there is no waste?

7.) Martin plans to construct a rectangular kennel for two dogs using 120 feet of chain-link fencing. He plans to fence all four sides and down the middle to keep the dogs separate. What overall dimensions will maximize the total area fenced?

8.) Kim wants to construct rectangular pens for four animals with 400 feet of fencing. To get four separate pens, she will fence a large rectangle and then fence through the middle of the rectangle parallel to the length and parallel to the width. What overall dimensions will maximize the total area of the pens?

9.) Mike wants to enclose a rectangular area for his rabbits alongside his large bar using 30 feet of fencing. What dimensions will maximize the area fenced if the barn is used for

one side of the rectangle?

10.) Kevin wants to enclose a rectangular garden using 14 eight-ft railroad ties, which he cannot cut. What are the dimensions of the rectangle that maximize the area enclosed?

11.) Mona Kalini gives a walking tour of Honolulu to one person for $49. To increase her business, she advertised at the National Orthodontist Convention that she would lower the price by $1 for each additional person, up to 49 people. What is maximum revenue for her tour?

12.) At $10 per ticket, Willie Williams and the Wranglers will fill all 8000 seats in the Assembly Center. The manager knows that for every $1 increase in the price 500 more tickets will go unsold. What ticket price will maximize the revenue?

13.) Find the point (x, y) on the graph of $y = \sqrt{x}$ nearest the point $(4, 0)$.

14.) Three hundred books are sold for $40 each. For each $5 increase in price, 25 fewer books are sold. What price per book will maximize revenue?

15.) In a town of 5000 people, the daily rate of infection with a flu virus varies directly (i.e directly proportional) with the product of the number of people who have been infected and the number of people not infected. When 1000 people have been infected, the flu is spreading at a rate of 40 new cases per day. For what number of people infected is the daily rate of infection at its maximum? Also, what is the maximum daily rate of infection?

16.) An architect is designing a race track with semicircular ends, as shown in the figure below. The length of the track (i.e perimeter) is to be one mile. Find the dimensions that will maximize the area of the rectangular center section?