**Mrs.Volynskaya AP Calculus AB Test Chapter 3 Name\_\_\_\_\_\_\_\_\_\_**

1. A rectangular sheet of cardboard measures 10 cm by 15 cm. Equal squares are cut out of each corner and the sides are turned up to form an open rectangular box. What is the maximum volume of the box?

2. At 11:00 AM, Madison’s ship is 100 km east of Tony’s ship. Madison’s ship is sailing south at 35 km/h and Tony’s ship is sailing north at 25 km/h. How fast is the distance between the ships changing at 2:00 PM?

3. A piece of wire 60 cm in length is cut into two pieces. The first piece forms a rectangle 5 times as wide as it is long. The second piece forms a square. Where should the wire be cut to:

(a) minimize the total area

(b) maximize the total area

4. A man starts walking north at 4 ft/s from a point P. Five minutes later, a woman starts walking south at 5 ft/s from a point 500 ft due east of P. At what rate are the people moving apart 15 minutes after the woman starts walking?

5. Consider the function . Note that . Your friend claims that by the Mean Value Theorem,  should be zero for some *c* with 0 < *c* < 2.

(a) Find such a value of *c* or show that it does not exist.

(b) Does your answer to part (a) contradict the Mean Value Theorem? Give reasons for your answer.

6. Find all numbers *c* that satisfy the conclusion of the Mean Value Theorem for the function $f\left(x\right)=x^{3}+x-1$ on the closed interval [0,2].

7. If the graph of  has a point of inflection at (2,-2), what is the value of ?