MCV4U - Unit 3 Test
Derivatives and Their Applications

Mark: _____

Answer all questions on this paper. Be sure to show all <u>applicable</u> work and express all answers in simplest form. Marks are awarded for presentation and technical correctness.

- 1. A paint company estimates that the cost in dollars, C, of producing x litres of paint per day is $C(x) = 0.0006x^2 + 8x + 3000$.
 - A) Find the cost of producing 125 litres.
- [2]
- B) Find the marginal cost of producing 125 litres. [2]

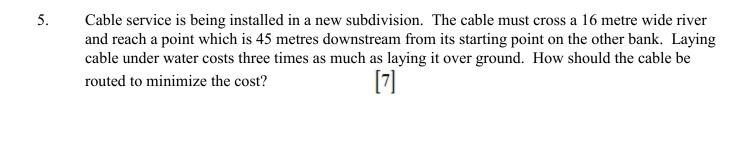
2. Let the function $s(t) = -\frac{5}{2}t^2 + 10t + 15$ represent the motion of a toy car as it travels near a sensor. At what time t will the car's distance from the sensor be the greatest? What is its velocity when the car is at that point?

CHOICE: Do any <u>five</u> questions from #3 - #8. Be sure to label the five you want marked.

3. A rectangular wooden bedding chest will be built so that its length is 4 times its width. The top, front, and two sides of the chest will be oak. The back and bottom of the chest will be cedar. The volume of the chest must be 2.4 m³. Oak costs 2 times as much as cedar. Find the dimensions that will minimize the cost of the chest.

4. Deeg and Coutu are both training for a marathon. Deeg's house is located 10 km north of Coutu's house. At 8 AM one Saturday morning, Deeg leaves his house and jogs south at 7 km/h. At the same time, Coutu leaves his house and jogs east at 2 km/h. When are Deeg and Coutu closest together, given that they both run for 3 hours?

[7]



6. A rectangle is bounded by a semi-circle with equation $y = \sqrt{49 - x^2}$, $-7 \le x \le 7$ and the x-axis. Find the dimensions of the rectangle having the largest area. [7]

7.	A cylindrical pot, without a top, is to have a volume of 200 copper and the rest of aluminum. Copper is three times as dimensions that will minimize the cost of the pot.	0 cm ³ . The bottom will be made of expensive as aluminum. Determine the [7]	

8.	bent to form a circle. What are the lengths of the tw	A 50 cm piece of wire is cut into two pieces. One piece is bent to form a square. The other piece is bent to form a circle. What are the lengths of the two pieces such that the sum of the areas of the			
	square and circle is a minimum? [7]				