

Notre Dame University-**LOUAIZE**

Faculty of Natural and Applied Sciences

Department of Mathematics & Statistics

**MAT 105**

**Principles of Calculus**

**Exam II**

**May 16, 2016**

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| --- | --- | --- |
| **Problem**  **Number** | **Points** | **Score** |
| **1** | **20** |  |
| **2** | **6** |  |
| **3** | **15** |  |
| **4** | **15** |  |
| **5** | **20** |  |
| **6** | **15** |  |
| **7** | **9** |  |
| **Total** | **100** |  |

**Duration: 60 minutes**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Section: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Instructor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Grade: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Directions:**

1. **Write neatly and clearly.**
2. **Do not use pencils except for graphing.**
3. **Show all work.**
4. **Scientific calculators are allowed.**
5. **Turn off your mobile phones.**

**I** - **(20 points)** Find the derivatives of each of the following functions:

.



.

d) Findthe second derivative of 

**II** - **(6 points)** Find the equation of the tangent line to the curve  at .

**III** - The total revenue function of a good is given by.

1. **(5 points)** Find the expression for the marginal revenue.
2. **(10 points)** If the current demand is, estimate the change in the value of TR due to a 2 unit decrease in.

**IV** - The production function is where Q denotes output and L denotes the size of the workforce.

1. **(12 points)** Calculate the value of the marginal product of labor when
2. L = 1
3. L = 4
4. L = 16
5. **(3 points)** Can we say that the law of diminishing marginal productivity holds in the given case? And why?

(**Note**: law of diminishing marginal productivity **is the same** as law of diminishing returns.)

**V** - Given the demand function such that Q is the quantity demanded of a good of price P.

1. **(8 points)** Determine the elasticity of demand when the quantity increases from 32 to 50.
2. **(8 points)** Find the price elasticity of demand when q = 41.
3. **(8 points)** Based on b), if the price rises by 4%, calculate the corresponding percentage change in demand.

**VI** - A firm’s short run production function is given by where L denotes the number of workers.

1. **(8 points)** Find the size of workforce that maximizes output.
2. **(7 points)** Find that maximum.

**VII** - The demand equation of a good is, and the total cost function is .

1. **(3 points)** Show that the total revenue is.
2. **(6 points)** Using derivatives, find the level of output that maximizes profit