

 Notre Dame University-**LOUAIZE**

Faculty of Natural and Applied Sciences

 Department of Mathematics & Statistics

**MAT 105**

 **Principles of Calculus**

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| --- | --- | --- |
| **Problem****Number** | **Points** | **Score** |
| **1** | **12** |  |
| **2** | **15** |  |
| **3** | **06** |  |
| **4** | **09** |  |
| **5** | **10** |  |
| **6** | **10** |  |
| **7** | **18** |  |
| **8** | **20** |  |
| **BONUS** | **08** |  |
| **Total** | **108** |  |

 **Exam I**

 **October 31, 2016**

 **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.**

**Note that you have 8 questions + 1 BONUS in a total of 10 pages.**

1. **(12 points)** Solve the following equations and inequalities:
	1. ****
	2. 
	3. ****
2. **(15 points)** Sketch the following three lines on the same diagram:

-5

-4

-3

-2

-1

0

1

2

3

4

5

 -5

 -4

 -3

 -2

 -1

 0

 1

 2

 3

 4

 5







Then solve each of the following systems of equations and comment on the nature of the solutions:

* 1. ****

 **b.**

1. **(6 points)** Solve the following: **(up to 2 decimal places)**
	* 1. 

 **b. **

1. **(9 points)** Use the rules of logarithms to express:
	* 1. ** in terms of  and 

 **b. ** in terms of  and .

**c. ** as a single logarithm.

1. **(10 points)** After a **** increase in a selling price, a refrigerator costs**.**

Since nobody bought the refrigerator at this price, the store decided to cancel this increase in favor of a 20% reduction instead.

* 1. Find the new selling price of the refrigerator.
	2. If V.A.T (TAX) is to be imposed to the final net selling price, please compute that price after a 10% V.A.T.
1. **(10 points)** Find the equivalent **** of 2 **discounts of 15% S.F.** (Scale Factor), followed by **10% S.F**.; finally a **10% V.A.T.** was applied on the price of a certain good whose **selling price is 500.**
	1. Find .(7 points)
	2. Calculate/Determine the final selling price of that good after the two discounts and the 10% V.A.T. (3 points)

1. **(18 points)** The supply and demand equations of a good are given by:

  and  where and denote price, quantity supplied and quantity demanded respectively.

* 1. Calculate the equilibrium price and quantity.
	2. Calculate the new equilibrium price and quantity if the government imposes a fixed tax of on each good. How much of the tax is paid by the firm?
1. **(20 points)** The demand function for a firm’s product is given by , where  denotes the price and  the quantity demanded.

The variable costs per good are $ 4 and the fixed costs are.

* 1. Write down expressions for the total revenue, the average revenue, the total cost  and the average cost  in terms of .
	2. Show that the profit function is given by: .
	3. Find the values of  where the firm breaks evenand find the maximum profit. **Draw the graph of the profit function on the next page**.

**Graph here**

**BONUS** - **(08 points)**

**Solve the following Linear System using any method you like; you must show your detailed work.**

