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| **Student’s Name** | **Student’s ID** | **Group Number** |
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| **Question Number** | **I** | **II** | **III** | **IV** | **V** | **Total** |
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| ***Question I:* [9 Points]**  **A. Let Show that** |
| **B. If , and . Find and**  **C. Let**  **i) Prove  and  exist**  **ii) Is  continuous at Justify your answer**  **iii) Is  differentiable at Justify your answer**  **iv) Find**  ***Question II:* [7 Points]**  **A. Find the area of the region  that lies outside the circle  and inside the circle**    **B. Find the volume of the solid that lies under the graph  over the region in the -plane bounded by**  **, ,  and**  **C. Use a triple integral to find the volume of the region bounded by the graphs of the equations**  **, ,  and**  ***Question III:* [6 Points]**  **A. Find the absolute extrema of  on the closed region bounded by the -axix,**  **-axis and the line**  **B. Use Lagarange Multipliers to find the extrema of subject to the constraint**  ***Question IV:* [11 Points]**  **A. Determine whether the given series is absolutely convergent, conditionally convergent or divergent.**  **i)**  **ii)**  **iii)**  **B. Determine whether the sequence  is convergent or divergent.**  **C. Use the Integral Test to show that the series  diverges**  ***Question V:* [10 Points]**  **A. Find the radius and the interval of convergence for the power series**  **B. i) Find the Maclaurin series for**  **ii) Use the first three non-zero terms of the Maclaurin series of to approximate the number  and estimate the error in this approximation.** |
| **C. Find a power series representation of  and specify interval of convergence.**  **D. Find the Taylor series for  at** |

Good Luck ☺