Universiti Teknologi Malaysia
Department of Mathematical Sciences

SSCE1993/SSE1893 **Assignment 1** **SPACE UTM/KL**

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**ANSWER ALL QUESTIONS**

1] Sketch the level curves of the function $z = f(x,y) = -2 + \sqrt{x^2+y^2}$ for $z = -1, 0, 2$ in the $xy-$plane. Then sketch the graph of the function $f$ in the three dimensional coordinate system, $xyz-$space.

[6 marks]

2] If $u = x^4y + y^2z^3$, where $x = rse^t$, $y = rs^2e^t$, and $z = r^2s\sin t$, find the value of $\dfrac{\partial u}{\partial s}$ when $r = 2$, $s = 1$, and $t = 0$.

[6 marks]

3] Find $\dfrac{\partial z}{\partial x}$ and $\dfrac{\partial z}{\partial y}$ for the function defined implicitly by $xyz = 4y^2z^2 + 2e^{xy}\ln x$.

[6 marks]

4] Suppose that we have designed a cylindrical storage of radius 6 m and height 10 m, and we are asked to increase the radius by 0.2 m and the height is to decreased by 0.1 m. Approximate the change in volume by using partial derivative. [6 marks]

5) Find all critical points for the function $f(x,y) = x^3 - 3xy + y^3$ if they exist. Then classify these points as local maximum, local minimum, or saddle point.

[8 marks]

6] Evaluate $\iint_R (x + 2y) \quad dA$ where $R$ is the region bounded by the parabolas $y = 2x^2$ and $y = 1 + x^2$.

[8 marks]