# Math 2513 – Summer 2024

## Assignment 1

Due: May 22, 2024 – 11:59PM

Q1 - Consider the equation x2 − y2 + z2 − 2x + 2y + 4z + 2 = 0.

(A) Reduce the equation to one of the standard forms and identify the surface.

(B) For appropriate constants, consider the cross-sections of the surface on the x = constant, y = constant and z =constant planes. Classify each curve as a line, circle, ellipse, parabola or hyperbola. Justify your answer by stating the equation of each curve.

Q2 - Find an equation for the surface consisting of all points that are equidistant from the point (0,0,1) and the plane z = -1. Identify the surface.

Q3 - Give the first partial derivatives of the following functions:

(A) f(x, y) = x (x + y)2

(B) u(r, θ) = sin(r cos θ)

(C) f(x, y) = xy

Q4 - Find all second partial derivatives and verify Clairaults Theorem.

(A) f(x, y) = x4 y − 2x3 y4

(B) T(t, θ) = e−2t cos θ