MAT110: Differential Calculus and Coordinate Geometry

Assignment 2

Total Marks: 100

Please write your name, ID and section on the first page of the assignment answer script. The last date of submission is Dec 19, 2022. Solve all problems.

Q1	If $y = \cos(m \sin^{-1} x)$,Show that $(1-x^2)y_{n+2} = (2n+1)xy_{n+1} + (n^2 - m^2)y_n$ Also find out $y_n(0)$.
Q2	Suppose that the temperature at a point (x, y, z) in space is given by $T(x, y, z) = \frac{80}{\sqrt{1+x^2+2y^2+3z^2}}$, where T is measured in degrees Celsius and x, y, z in meters. In which direction does the temperature increase fastest at the point $(1,1,-2)$? What is the maximum rate of increase? Hints: The maximum value of the directional derivative $D_u f(x)$ is $\lvert\nabla f(x)\rvert$ and it occurs when $\hat{u}$ has the same direction as the gradient vector $\nabla f(x)$.