QUIZ 14-B

Math 142, Basic Calculus II, 14.06.2021

1. Use polar coordinates to find the limit

$$\lim_{(x,y)\to(0,0)} \frac{e^{-x^2-y^2}-1}{x^2+y^2}$$

(If (r,θ) are polar coordinates of the point (x,y) with $r \geqslant 0$, note that $r \to 0^+$ as $(x,y) \to (0,0)$)

2. The temperature at a point (x,y,z) is given by $T(x,y,z) = 10e^{-2x^2-y^2-z^2}$ where T is measured in $^\circ C$ and x,y,z in meters.

a) Find the rate of change of temperature at point $P(-1,-1,3)$ in the direction $Q(1,0,3)$.

b) In which direction does the temperature increase fastest at $P(-1,-1,3)$?

c) Find the maximum rate of incease at $P(-1,-1,3)$.