Quiz-2: Solutions

① Check that $f(x,y) \le f(0,0)\ \forall (x,y) \in \mathbb{R}^2$

Option - b

② Check that the minimum value occurs at $(0,0)$ and maximum value occurs at $\left(\frac{3}{2}, \pm\frac{\sqrt{15}}{2}\right)$.

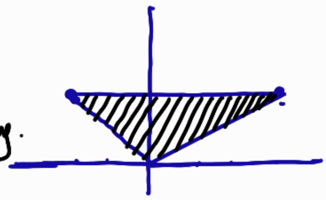
Option - d

③ $f_{xx} = -y\sin x$, $f_{xy} = \cos x$, $f_{yy} = 0$, $H = \begin{pmatrix} -y\sin x & \cos x \\ \cos x & 0 \end{pmatrix}$

$\Rightarrow$ $\det H < 0 \Rightarrow$ all critical points are saddle point & there are infinitely many saddle point.

Option - c

④ The only critical point lies in the domain is $(0,0)$ which is in the boundary.



So no critical point in the interior.

Since f is continuous in the closed & bounded domain so it always has absolute maxima & minima on D.

$\Rightarrow$ The absolute maxima & minima exist at boundary.

Option - d

⑤ Derive from Lagrange's multiplier method that f has maximum at $(10, 100)$.

Option - c

⑥ Check that (0,0) is the saddle point..

Option - c

⑦ The curve is an infinite curve so no-point on C which is farthest from origin.

Option - c

⑧ Solve the Lagrange multiplier equations.

Option - d

⑨ det H = 0 at (x_0, y_0). In this case any of the three cases can occur.

Option - d

⑩ Option - c