C $r(t) = (\cos t)\,i + (\sin t)\,j$, $0 \le t \le 2\pi$

$$G = \frac{-y}{x^2+y^2}\,i + \frac{x}{x^2+y^2}\,j$$

$$= \frac{-\sin t}{\sin^2 t + \cos^2 t}\,i + \frac{\cos t}{\sin^2 t + \cos^2 t}\,j$$

$$= (-\sin t)\,i + (\cos t)\,j$$

$$\frac{dr}{dt} = (-\sin t)\,i + (\cos t)\,j$$

$$\oint G \cdot dr = \oint_C G \cdot \frac{dr}{dt}\,dt$$

$$= \int_0^{2\pi} (\sin^2 t + \cos^2 t)\,dt$$

$$= 2\pi \neq 0$$

$\because \oint G \cdot dr \neq 0$

$\therefore$ G isn't conservative by Thm 3.

(d) Find if there exists h, a differential function, such that $H = \nabla h$