TRUE / FALSE SOLUTIONS

1. T
2. F (see Examples 3 and 4 in Lecture #1)
3. F (but T if you assume D is open + connected!) ↳ ind of path ⟺ cons.
4. T (because $\mathbb{R}^2$ is simply-connected)
5. F (check the partials! $\frac{\partial P}{\partial x} = \frac{\partial^2 f}{\partial x^2} \neq \frac{\partial^2 f}{\partial y^2} = \frac{\partial Q}{\partial y}$)
6. F (but T if you assume D is open and connected!

   ind of path ⟹ conservative ⟹ $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$
7. T (D is open and connected, $\int_C \vec{F} \cdot d\vec{r} = 0 \Leftrightarrow$ ind of path ⟺ cons)
8. F (need D to be simply-connected!)
9. F ($\frac{\partial M}{\partial x} = \frac{\partial^2 f}{\partial x^2} = \frac{\partial^2 f}{\partial y^2} = \frac{\partial N}{\partial y}$ tells you nothing about cons.)
10. F (Assume this is true. Then $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$ on $\tilde{D}$, but since D is in $\tilde{D}$ and $\frac{\partial P}{\partial y} \neq \frac{\partial Q}{\partial x}$ on D, this is a contradiction. It must be false!)