MATH 2023 – Multivariable Calculus

Lecture #03 Worksheet ♡ February 14, 2019

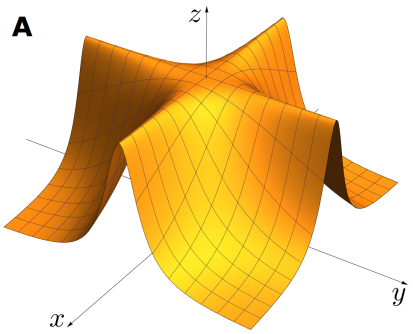
Problem 1. Find the arc length parametrization of the following curve from the point $(1, 0)$.

$$\mathbf{r}(t) = \left(\frac{2}{t^2+1} - 1\right)\mathbf{i} + \frac{2t}{t^2+1}\mathbf{j}$$

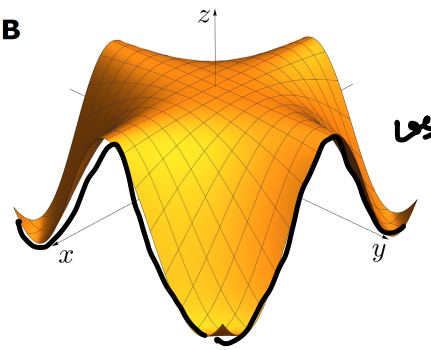
What can you conclude about the curve?

Problem 2. Identify the graphs with the corresponding functions $z = f(x, y)$.

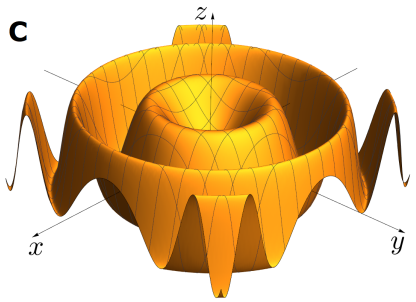
A



B



C



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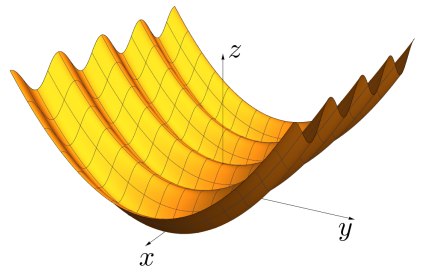
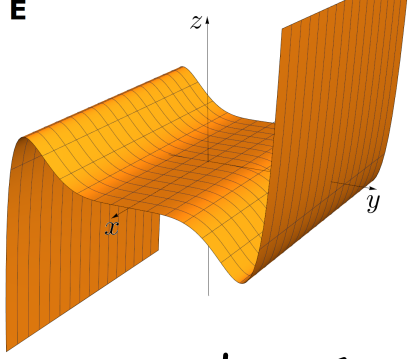
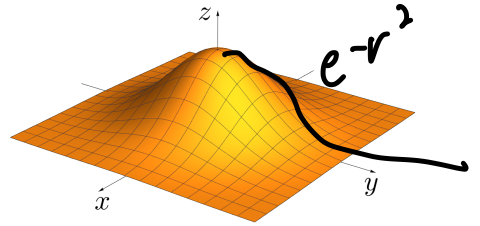


E



F



rotate a sin curve

$\frac{1}{1+r^2}$

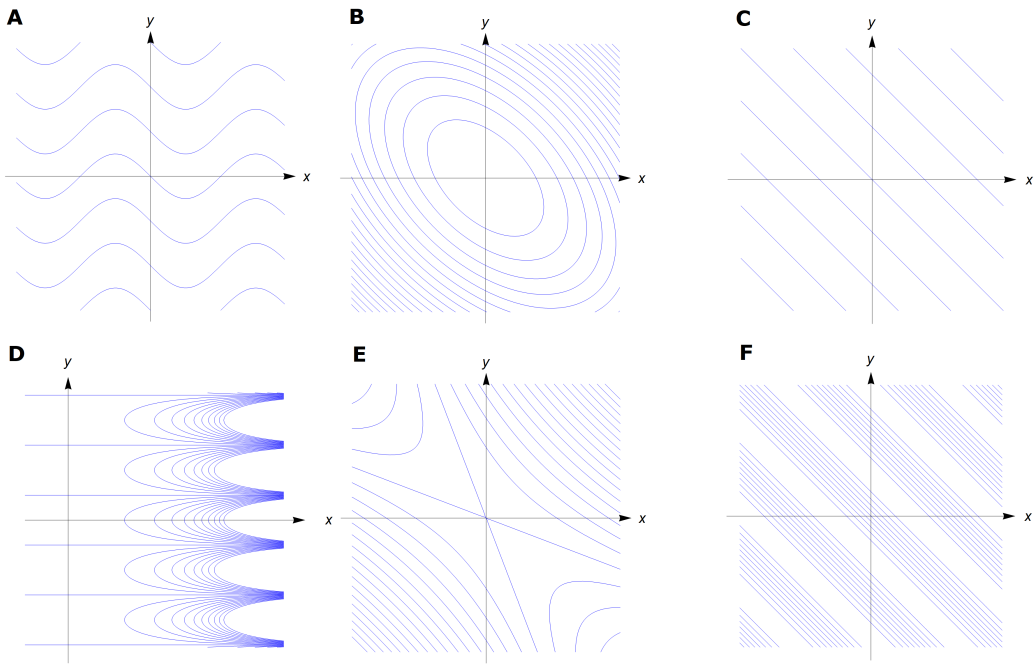
$\cos(x^2) + y^2$	$\sin(x^2 + y^2)$	$e^{-x^2-y^2}$	$\cos(xy)$	$y^7 + 3y^2$	$\frac{1}{1+x^2y^2}$
D	C	F	B	E	A

Fix x 睇 y
Fix y 睇 x

rotate e^{-r}

No $\geq$ involved

Problem 3. Identify the level sets with the corresponding functions $z = f(x, y)$.



$x + y$	$\sin(x + y)$	$\sin x + y$	$x^2 + xy + y^2$	$x^2 + 3xy + y^2$	$e^x \cos y$

Bonus Problem. Plot the graph and the level sets of the following function

$$f(x, y) = (x^2 + y^2 - 1)^3 - x^2 y^3.$$