Discovery Exercise for Multivariate Fourier Series

1. Have a computer plot the function $z(x, y) = \sin(3x)\cos(10y)$ on the domain $-2\pi/3 \le x \le 2\pi/3$, $-2\pi/3 \le y \le 2\pi/3$.

2. Have a computer make an animation of the function $y(x, t) = \sin(3x)\cos(10t)$ on the domain $-2\pi/3 \le x \le 2\pi/3$, $0 \le t \le 2\pi/3$. In other words make a video that starts as a plot of $y(x, 0)$ and changes into a plot of $y(x, \delta t)$, $y(x, 2\delta t)$, and so on up to $y(x, 2\pi/3)$, where δt is a number much smaller than $2\pi/3$.

3. Redo Part 1 changing $\sin(3x)$ into $\sin(5x)$. Then redo it changing $\cos(10y)$ into $\cos(20y)$ (using $\sin(3x)$ again for this one). How did each of those changes affect the plot?

4. Similarly, redo Part 2 first changing $\sin(3x)$ into $\sin(5x)$ and then changing $\cos(10t)$ into $\cos(20t)$. How did each of those changes affect the animation?