1. $f(t) = \sin(t)\cos(2t) + 5\cos(3t)\sin(4t)$

$= \dfrac{1}{2}\left[\sin(3t) + \sin(-t)\right] + \dfrac{5}{2}\left[\sin(7t) - \sin(-t)\right]$

$= -2\sin(-t) + \dfrac{1}{2}\sin(3t) + \dfrac{5}{2}\sin(7t)$

$= 2\sin(t) + \dfrac{1}{2}\sin(3t) + \dfrac{5}{2}\sin(7t)$