

$$1) (\sin(u+v) - e^{iu} \sin v)^n = (\sin u \cos v + \cos u \sin v - \cos u \sin v - i \sin u \sin v)^n = \\ = \sin^n u (\cos v - i \sin v)^n = e^{-inv} \sin^n u$$

$$2) \sin(u+nv) - e^{iu} \sin nv = \frac{1}{2i} (e^{i(u+nv)} - e^{-i(u+nv)} - e^{i(u+nv)} + e^{i(u-nv)}) = \frac{e^{-inv}}{2i} (e^{iu} - e^{-iu}) = e^{-inv} \sin u$$