

Q2)

Idea:

WKT $e^{ix} = \underbrace{\left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \dots\right)}_{\cos x} + i \underbrace{\left(x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots\right)}_{\sin x}$

Given hint in Question: $e^{i(x+\pi/2)} = ie^{ix}$

$\Rightarrow e^{i(x+\pi/2)} = ie^{ix} = i \underbrace{\left(1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \dots\right)}_{\sin x} + (-1) \underbrace{\left(x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots\right)}_{\cos x}$

For following intervals the domain:

 $\sin(x) = \sin(\pi - x)$ for x in $[3\pi/4, 5\pi/4]$ $\sin(x) = \cos(x - \pi/2)$ for x in $[\pi/4, 3\pi/4]$ $\sin(x) = -\cos(3\pi/2 - x)$ for x in $[5\pi/4, 7\pi/4]$

Reference time: 17.6219

Taylor time: 2.4198

Error: 6.928125e-12

Intrin time: 0.8572

Error: 6.928125e-12

Vector time: 0.5064

Error: 2.454130e-03

-----Calculations for outside $[-\pi/2, \pi/2]$ -----

Reference time: 40.2313

Taylor time: 46.2948

Error: 6.930900e-12

Intrin time: 54.8270

Error: 6.930900e-12