

Math 417 – Section 37 Solutions

2. (b) Evaluate $\int_0^{\pi/6} e^{i(2t)} dt$.

$$\begin{aligned}\int_0^{\pi/6} e^{i(2t)} dt &= \int_0^{\pi/6} (\cos 2t + i \sin 2t) dt \\&= \int_0^{\pi/6} \cos 2t dt + i \int_0^{\pi/6} \sin 2t dt \\&= \left[\frac{1}{2} \sin 2t \right]_0^{\pi/6} + i \left[-\frac{1}{2} \cos 2t \right]_0^{\pi/6} \\&= \frac{1}{2} \sin \frac{\pi}{3} + i \left[-\frac{1}{2} \cos \frac{\pi}{3} + \frac{1}{2} \right] \\&= \frac{\sqrt{3}}{4} + i \left(-\frac{1}{4} + \frac{1}{2} \right) \\&= \frac{\sqrt{3}}{4} + \frac{i}{4}\end{aligned}$$