T1/e1	Miquel García-Marrón Coma	CCQ
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ENTREGA 1

(1)

a) $\bar{z}_1 + \bar{z}_2 = (5+3i)+(-2-5i) = \boxed{3-2i} = \sqrt{3^2+2^2}\cdot e^{i\,tg^{-1}\left(\frac{-2}{3}\right)} =$

$= 3{,}61\, e^{-i0{,}58} = \boxed{3{,}61 \angle -33{,}2^\circ}$

b) $\bar{z}_1 - \bar{z}_2 = (5+3i)-(-2-5i) = \boxed{7+8i} = \sqrt{7^2+8^2}\cdot e^{i\,tg^{-1}\left(\frac{8}{7}\right)} =$

$= 10{,}63\, e^{-i\,0.85} = \boxed{10{,}63 \angle 48{,}81^\circ}$

c) $\bar{z}_1 \cdot \bar{z}_2 = (5+3i)\cdot(-2-5i) = -10-25i-6i-15i = \boxed{5-31i} =$

$= \sqrt{5^2+31^2}\; e^{i\,tg^{-1}\left(\frac{-31}{5}\right)} = \boxed{31{,}4 \angle -80{,}8^\circ}$

d) $\bar{z}_1 = 5+3i = \sqrt{5^2+3^2}\; e^{i\,tg^{-1}\left(\frac{3}{5}\right)} = 5{,}83 \angle 30{,}96^\circ$

$\bar{z}_2 = -2-5i = \sqrt{2^2+5^2}\; e^{i\,tg^{-1}\left(\frac{-5}{2}\right)} = 5{,}39 \angle 68{,}2^\circ$

$\frac{\bar{z}_1}{\bar{z}_2} = \frac{(5+3i)}{(-2-5i)} = \frac{(5+3i)}{(-2-5i)}\cdot\frac{-2+5i}{-2+5i} = \frac{-10+25i-6i+15i^2}{4+10i+10i+25i^2} \simeq \frac{-25+19i}{29}$

$= \boxed{\frac{-25}{29}+\frac{19}{29}i} = \sqrt{\left(\frac{25}{29}\right)^2+\left(\frac{19}{29}\right)^2}\cdot e^{i\,tg^{-1}\left(\frac{\frac{19}{29}}{-\frac{25}{29}}\right)} = \boxed{1.08 \angle -37{,}23^\circ}$

e) $\bar{z}_1 + \bar{z}_2^* = 5+3i-2+5i = \boxed{3+8i} = \sqrt{3^2+8^2}\; e^{i\,tg^{-1}\left(\frac{8}{3}\right)} = \boxed{8{,}54 \angle 69{,}44^\circ}$

f) $\frac{\bar{z}_1}{\bar{z}_2^*} = \frac{5+3i}{-2+5i} = \frac{5+3i}{-2+5i}\cdot\frac{-2-5i}{-2-5i} = \simeq \frac{5-31i}{29} = \boxed{\frac{5}{29}-\frac{31}{29}i} =$

$= \sqrt{\left(\frac{5}{29}\right)^2+\left(\frac{31}{29}\right)^2}\; e^{-i\,tg^{-1}\left(\frac{\frac{31}{29}}{\frac{5}{29}}\right)} = \boxed{1{,}08 \angle -80{,}83^\circ}$

(2)

derivem una

derivem 2a vegada

$\frac{\partial^2 f}{\partial x^2} \Rightarrow Ae^{ik(x-vt)}\cdot \cancel{x}ki \Rightarrow Ae^{ik(x-vt)}\cdot(ki)^2 \cancel{xi}$

tot op

$\frac{\partial^2 f}{\partial t^2} = Ae^{ik(x-vt)}\cdot(vik)^2$

$Ae^{ik(x-vt)}\cdot(ki)^2 - \frac{1}{v^2}\cdot Ae^{ik(x-vt)}(vik)^2 = 0$

→ Eliminem v^2 i restem llavors dona 0.

$1\angle{-\pi}$

③

$\rightarrow e^{-i\pi} \cdot 5 \cdot e^{-i\frac{\pi}{4}} = 1 \cdot 5 \cdot 1 \angle{-\pi + 0 - \frac{\pi}{4}} = 5\angle{-\frac{5}{4}\pi} =$

$= 5\cos\left(\frac{5}{4}\pi\right) + i\,5\sin\left(\frac{5}{4}\pi\right) = \boxed{-3{,}53 + i\,3{,}53}$

$\rightarrow e^{-i\frac{\pi}{2}} \cdot \left[2e^{i\frac{\pi}{2}} + 3e^{-i\frac{\pi}{2}}\right] = 1 \cdot 2\angle{-\frac{\pi}{2}+\frac{\pi}{2}} + 1 \cdot 3\angle{-\frac{\pi}{2}-\frac{\pi}{2}} =$

$= 2\angle{0} + 3\angle{-\pi} = 2 + (-3 + i0) = \boxed{-1}$

$\rightarrow \dfrac{4e^{-i\frac{\pi}{2}}}{e^{i\frac{3\pi}{2}}} + \dfrac{-2e^{i\pi}}{e^{i\frac{3\pi}{2}}} = \dfrac{-i4}{-i4} + \dfrac{2}{-i \cdot 1} = \dfrac{2-4i}{-i} =$

$= \dfrac{2-4i}{-i} \cdot \dfrac{-i}{-i} = \dfrac{-2i + 4i^2}{i^2} \ldots \Rightarrow \boxed{4+2i}$

④

$\cancel{\sin}\ \cos x = F(x)$

$F(x) = \cos x \rightarrow \cos 0 = 1$

$F'(x) = -\sin x \rightarrow -\sin 0 = 0$

$F''(x) = -\cos x \rightarrow -\cos 0 = -1$

$F'''(x) = \sin x \rightarrow \sin 0 = 0$

$F''''(x) = \cos x \rightarrow \cos 0 = 1$

$\vdots \quad \Downarrow$: Taylor

$\cancel{\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} -}$

$\boxed{\cos x = \frac{1}{0!}x^0 + \frac{0}{1!}x^1 - \frac{1}{2!}x^2 + \frac{0}{3!}x^3 + \ldots}$

$\hookrightarrow = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \ldots$

$\sin x = g(x)$

$g(x) = \sin x \rightarrow \sin 0 = 0$

$g'(x) = \cos x \rightarrow \cos 0 = 1$

$g''(x) = -\sin x \rightarrow -\sin 0 = 0$

$g'''(x) = -\cos x \rightarrow -\cos 0 = -1$

$g''''(x) = \sin x \rightarrow \sin 0 = 0$

$\vdots \quad \Downarrow$. Taylor

$\boxed{\sin x = \frac{x}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots}$

⑤

↓ unus.

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$$\cancel{e^{ix} = f(x) \quad \text{en } x=0}$$

$$\cancel{f(x) = e^{ix} \to e^{i\cdot 0} = 1}$$

$$\cancel{f'(x) = ie^{ix} \to ie^{i0} = i}$$

$$\cancel{f''(x) = i^2e^{ix} \to i^2e^{i\cdot 0} = i^2}$$

$$\cancel{e^{ix} = 1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \dots}$$

$$\cancel{\cos x + \sin x = 1 + x - \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!}}$$

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$i\sin(x) = f(x)$ en $x=0$ | $e^{ix} = g(x)$ en $x=0$

$f(x) = i\sin(x) \to i\sin 0 = 0$ | $g(x) = e^{ix} \to e^{i0} = 1$

$f'(x) = i\cos(x) \to i\cos 0 = i$ | $g'(x) = ie^{ix} \to ie^{i0} = i$

$f''(x) = -i\sin(x) \to -i\sin 0 = 0$ | $\cancel{g''(x) = i^2e^{ix} \to i^2e^{i0} = i^2}$

$f'''(x) = -i\cos x \to -i\cos 0 = -i$ | $\cancel{g'''}$ | $g'' \dots = -1$

$f''''(x) = i\sin(x) \to i\sin 0 = 0$ | $g''' \dots = -i$

$g'''' \dots = 1$

$$i\sin x = i\frac{x}{1!} - i\frac{x^3}{3!} + i\frac{x^5}{5!} - i\frac{x^7}{7!} + \dots \quad \Big\| \quad e^{ix} = 1 + i - \frac{x^2}{2!} - i\frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$

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

iguals ✓