4) $\hat{f}(w) = \frac{2}{\sqrt{2\pi}} \int_{-\infty}^{\infty} f(x) e^{-iwx}\,dx = \frac{-2}{\sqrt{2\pi}} \int_{-3}^{3} e^{-iwx}\,dx$

$= \frac{2}{\sqrt{2\pi}} \left[\frac{e^{-iwx}}{-iw} \right]_{-3}^{3} = \frac{-2i\left(e^{-i\cdot 3w} - e^{-i(-3)w}\right)}{w\sqrt{2\pi}} \quad \left[\because \frac{-2}{-i} = i \right]$

$= \frac{-2i\left(e^{-3iw} - e^{3iw}\right)}{w\sqrt{2\pi}}$, 0 otherwise

7) $2\angle \pi/6 + 4\angle 60°$

a) $\sqrt{x^2+y^2} = 2$ $\qquad$ $\arctan \frac{x}{y} = \frac{\pi}{6}$ $\qquad$ $2\angle \frac{\pi}{6}$

$2\left(\cos \frac{\pi}{6} + j \sin \frac{\pi}{6}\right) = 1.73 + j$

$4\left(\cos 60 + j \sin 60\right) = 2 + 3.46j$

$1{,}73 + j + 2 + 3.46j = 3.73 + 4.46 . j$

b) $(2\angle \pi/3) / (4+i3) =$ 0, 1, 2

$2\left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}\right) = 1 + 1.73i$

$\sqrt{\left(\frac{1+1.73i}{4+3i}\right)^2} = \frac{1-1.73}{16-9} = \frac{-0.73}{7} \approx \boxed{-0{,}1}$

7) c) $\frac{3-4i}{4+i2} = \frac{1}{5} - \frac{11}{10} i$

10) b) $\sin 7 \in [-1; 1] = \sin z \neq 10$

9)

B) $f(z) = x+iy$ | $u_x = x_0,\ v = -y$

$\bar{f}(z) = x - iy$

$u_x = 1 \quad v_x = 0$ | $u_x \neq v_y \quad u_y = -v_x$

$u_y = 0 \quad v_y = -1$

$f(\bar{z})$ doesnt satisfy

$f(\bar{z})$ is not analytic function

8) $z = \sqrt[5]{2+3i}$

$(2+3i)^{0.2} = 3.6 \cdot e^{i\,0.98} = (3.6 \cdot e^{i\,0.31\pi})^{0.2} = 3.6 \cdot e^{i\,0.2 \cdot 0.31}$

$= 1.26 + 0.25i$

Rectangular form = $z = 1.26 + 0.25i$

10) c) $Ln(5-12i)$

exp: $z = 2.82 \cdot e^{i\,-0.42} = 2.82 \cdot e^{i(-0.13)\pi}$

Rectangular form = $\underline{2.56 - 1.17i}$

6) $f = [1, 2, 0]$

$N = 3$

$W = e^{-2\pi i/3} =$ [illegible] $= i$

$a_1 = 3+0j$

$a_2 = 0-1.732j$

$a_3 = 0+1.732j$

$$f(k) = \sum_{n=0}^{N-1} x(n) e^{-j2\pi nk/N}$$

$$f(k) = \sum_{n=0}^{2} x(n) e^{-j2\pi nk/3}$$

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