MATH 171 - SOLUTIONS ASSIGN. 10

SECTION 12.1

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#6 $\quad \sqrt{-121} = \boxed{11j}$

#10 $\quad -\sqrt{-0.01} = \boxed{-0.1j}$

#14 $\quad -\sqrt{-5/9} = \boxed{-\dfrac{\sqrt{5}}{3}j}$

#18 $\quad \sqrt{(-15)^2} = \boxed{15}$

$\qquad \left(\sqrt{-15}\right)^2 = \boxed{-15}$

#20 (a) $\sqrt{-9}\sqrt{-16} = (3j)(4j) = \boxed{-12}$ $\qquad$ (b) $= \boxed{12}$

#24 $\quad -\sqrt{(-3)(-7)}\ \sqrt{-21} = (-\sqrt{21})(j\sqrt{21}) = \boxed{-21j}$

#26 (a) $-j^{22} = -j^2 = \boxed{1}$

$\qquad$ (b) $j^{408} = \boxed{1}$

#36 $\quad -\sqrt{1} - \sqrt{-400} = \boxed{-1 - 20j}$

#42 $\quad \sqrt{-27} + \sqrt{12} = 2\sqrt{3} + 3\sqrt{3}j$

$\qquad\qquad\qquad\qquad = \boxed{\sqrt{3}\,(2+3j)}$

#50 $\quad 2x + 3jy = -6 + 12j$

$\qquad 2x = -6 \qquad \boxed{x = -3}$
$\qquad 3y = 12 \qquad \boxed{y = 4}$

#52 $\quad 9 - j = xj + 1 - y$
$\qquad 8 - j = xj - y \quad \Longrightarrow \quad \boxed{x = -1 \quad y = -8}$

#54 $2x - 6xj^3 - 3j^2 = yj - y + 7j^5$

$2x + 6xj + 3 = yj - y + 7j$

$2x + 6xj - yj + y = -3 + 7j$

$2x + y = -3 \implies y = -2x - 3$

$6x - y = 7 \implies 6x + 2x + 3 = 7$

$8x = 4$

$x = \frac{1}{2}$

$y = -2(\frac{1}{2}) - 3 = -4$

$\boxed{x = \frac{1}{2} \quad y = -4}$

#58 $x^3 + 27j = 0$

PLUG IN $3j$

$(3j)^3 + 27j = 27j^3 + 27j = -27j + 27j = 0$

$\boxed{3j \text{ IS A SOLUTION}}$

$(-3j)^3 + 27j = -27j^3 + 27j = -27(-j) + 27j$

$= 54j \neq 0$

$\boxed{-3j \text{ NOT A SOLUTION}}$

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 # 10 $(7-j) - (4-4j) + (6-j) = \boxed{9+2j}$

 # 12 $\boxed{-0.194 + 0.083j}$

 # 16 $(8j-5)(7+4j) = \boxed{-67+36j}$

 # 22 $j^2\sqrt{-7} - \sqrt{-28} + 8 = -\sqrt{7}j - \sqrt{28}j + 8$

$$= -\sqrt{7}j - 2\sqrt{7}j + 8$$

$$\boxed{= 8 - 3\sqrt{7}j}$$

#26 $(1+j)(1-j)^2 = 2(1-j) = \boxed{2-2j}$

 # 30 $\dfrac{6+5j}{3-4j}\dfrac{(3+4j)}{(3+4j)} = \boxed{\dfrac{-2+39j}{25}}$

#32 $\dfrac{j^5-j^3}{3+j} = \dfrac{j+j}{3+j} = \dfrac{2j}{3+j}\dfrac{(3-j)}{(3-j)} = \dfrac{2+6j}{10}$

$$\boxed{= \dfrac{1+3j}{5}}$$

 # 37 PLUG IN $-1-j$ INTO x^2-2x+2

$(-1-j)^2 + 2(-1-j) + 2 = 2j - 2 - 2j + 2 = \boxed{0}$

 # 38 plug $1-j\sqrt{3}$ INTO

$$x^2 + 4 - 2x$$

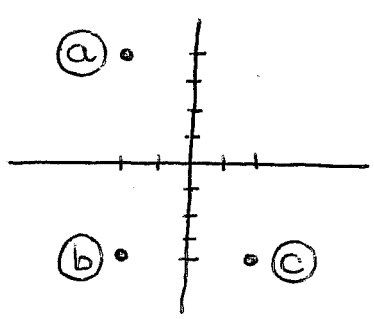$(1-j\sqrt{3})^2 + 4 - 2(1-j\sqrt{3}) = -2 - 2j\sqrt{3} + 4 - 2 + 2j\sqrt{3} = \boxed{0}$

#48

$$Z_T = \frac{(2+3j)(3-4j)}{(2+3j)+(3-4j)}$$

$$= \frac{(18+j)}{(5-j)}\frac{(5+j)}{(5+j)}$$
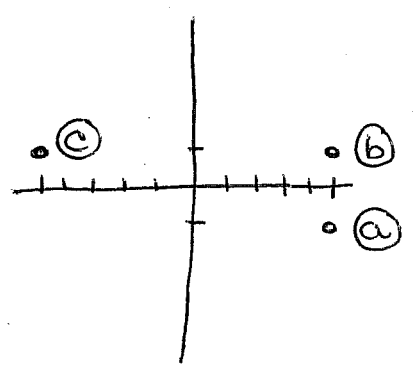
$$= \boxed{\frac{89+23j}{26}}$$

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#30

@ $-2+4j$

conjugate ⓑ $-2-4j$

negative © $2-4j$

#32

@ $5-j$

conjugate ⓑ $5+j$

negative © $-5+j$