

NO CALCULATOR

Let $z_1 = 3 + 4i$ and $z_2 = 1 - i$

[1] Write $z_1 \cdot z_2^*$ in $a + bi$ form.

[2] Find $|z_2|$.

[3] Simplify i^{599}

[4] The zeros of $3x^4 - 6x^3 + 12x^2 - 15x + 1$ are a, b, c , and d . Find the following:

[a] $ab + ac + ad + bc + bd + cd$

[b] $abcd$

[c] $a + b + c + d$

[d] $abc + abd + acd + bcd$

[5] Solve $x(x-2)(x+3)^2 \leq 0$. Write your solution in interval notation.

[6] On a separate sheet of paper, show all work to find $\sqrt{z_1}$.

[7] On a separate sheet of paper, show all work to find $(3+i)^4$.

[8] On a separate sheet of paper, show all work to find all the zeros of $x^4 - 8x^3 + 23x^2 - 30x + 18$

[9] On a separate sheet of paper, find all the zeros of $x^4 - 10x^3 + 39x^2 - 70x + 50$ given that $x = 3 + i$ is one of the roots.

[10] On a separate sheet of paper, show all work to solve:
$$\begin{cases} (1+i)x + 2iy = 1 + 3i \\ 3x + (1+2i)y = 5 \end{cases}$$

[11] On a separate sheet of paper, show all work to solve:
$$\begin{cases} x + 3z = 11 \\ 2x - y = -4 \\ 2y + z = 8 \end{cases}$$

Calculator Section

[12] The roots of $x^3 + px^2 + qx + r = 0$ are $x_1 = 2$, $x_2 = 3$, and $x_3 = -4$.

[a] Find the value of p .

[b] Find the value of q .

[c] Find the value of r .

[13] The roots of $mx^2 + (m+1)x + m + 1 = 0$ are both non-real. Find the value of m .

[14] Solve. Express the answer in interval notation. $x^9 - 2x^2 + x \geq 0$.