Answer on Question #60617 – Math – Calculus

QUESTION

Write a polynomial function of minimum degree with real coefficients whose zeros include those listed. Write the polynomial in standard form. (2 points)

3, -13 and 5+4i

SOLUTION

According to the fundamental theorem of algebra, if the number $5+4i$ is a root of the equation, then the number of $5-4i$ is also a root of this equation.

Then,

$$(x-3)(x+13)\big(x-(5+4i)\big)\big(x-(5-4i)\big)=$$

$$=(x^2+13x-3x-3\cdot 13)\big(x^2-x(5-4i)-x(5+4i)+(25-16i^2)\big)=$$

$$=(x^2+10x-39)\Big(x^2-x(5-4i+5+4i)+\big(25-16\cdot(-1)\big)\Big)=$$

$$=(x^2+10x-39)(x^2-10x+41)=$$

$$=x^2\cdot x^2-10x\cdot x^2+41x^2+10x\cdot x^2-100x^2+410x-39x^2+390x-39\cdot 41=$$

$$=x^4+x^3(-10+10)+x^2(41-100-39)+x(410+390)-1599=$$

$$=x^4-98x^2+800x-1599.$$

ANSWER:

Polynomial in the standard form that has the specified roots is $x^4-98x^2+800x-1599$.