Finding Zeros of a Polynomial Function

Name:

Another method….. Direct Substitution

Date: Pd:

****

Recall:

Given: $f(x) = x^2 - 3x + 5$

Find: $f(2)$

Remember you substitute 2 in for the x, and evaluate following the order of operations. The answer represents the y-value that corresponds to the x-value.

$$f(2) = 2^2 - 3(2) + 5$$
$$= 4 - 6 + 5$$
$$= 3$$

Since $f(2) = 3$, then we know that (2, 3) is a point on the graph of f(x).

****

So, if $f(x) = 0$, then x is a zero of the function!

****

Given: $f(x) = x^4 + 2x^3 - 26x^2 + 18x - 315$		
Is -7 a zero of the function?	Is 2 a zero of the function?	Is 3i a zero of the function?
$f(-7) = (-7)^4 + 2(-7)^3 - 26(-7)^2 + 18(-7) - 315$ $f(-7) = 0$ so, yes -7 is a zero.	$f(2) = (2)^4 + 2(2)^3 - 26(2)^2 + 18(2) - 315$ $f(2) = -351$ No, 2 is not a zero. (2, -351) is a point on the graph of f(x).	$f(3i) = (3i)^4 + 2(3i)^3 - 26(3i)^2 + 18(3i) - 315$ $f(3i) = 0$ so, yes 3i is a zero. 3i is a zero, so -3i is also a zero.

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Using direct substitution, determine if each is a zero of the given function. Show work.

1) $f(x) = x^3 + 9x^2 - x - 105$	2	3	-5	-7	4
2) $f(x) = 3x^4 - 5x^3 - 10x^2 + 20x - 8$	-2	-3	4	5	2
3) $f(x) = 2x^3 + 5x^2 - 39x + 18$	3	-5	-6	$\frac{1}{2}$	2i
4) $f(x) = 2x^4 - 11x^3 + 30x^2 - 99x + 108$	4	3	-1	$\frac{3}{2}$	3i

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Key

Using direct substitution, determine if each is a zero of the given function. Show work.

1) $f(x)=x^3+9x^2-x-105$	2, 63 No	3, 0 Yes	-5, 0 Yes	-7, 0 Yes	4, 99 No
2) $f(x)=3x^4-5x^3-10x^2+20x-8$ $54+45-147+18$	-2, 0 Yes	-3, 220 No	4, 360 No	5, 1092 No	2, 0 Yes
3) $f(x)=2x^3+5x^2-39x+18$ $2(8i^3)+5(4i^2)-39(2i)+18$ $-16i-20-78i+18=-2-94i$	3, 0 Yes	-5, 88 No	-6, 0 Yes	$\frac{1}{2}$, 0 Yes	2i, $-2-94i$ No
4) $f(x)=2x^4-11x^3+30x^2-99x+108$ $2(81)-11(-27i)+30(-9)-99(3i)+108$ $162+297i-270-297i+108=0$	4, 0 Yes	3, -54 No	-1, 250 No	$\frac{3}{2}$, 0 Yes	3i, 0 Yes

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