3. 0/1 points LarTrig10 4.2.055.

Use the given zero to find all the zeros of the function. (Enter your answers as a comma-separated list. Include the in your answer.)

Function	Zero
$g(x) = x^3 - 8x^2 + 25x - 26$	$3 + 2i$

$\Rightarrow (x-(3+2i))$ is a factor.

We divide by $x-(3+2i)$

$x =$ ✗ $3-2i, 3+2i, 2$

$$\begin{array}{r|rrrr} 3+2i & 1 & -8 & 25 & -26 \\ & & 3+2i & -19-4i & 26 \\ \hline 3-2i & 1 & -5+2i & 6-4i & 0 \\ & & 3-2i & -6+4i & \\ \hline & 1 & -2 & 0 & \end{array}$$

sweet! Re-tito!

This work says $f(x) = (x-(3+2i))(x-(3-2i))(x-2)$

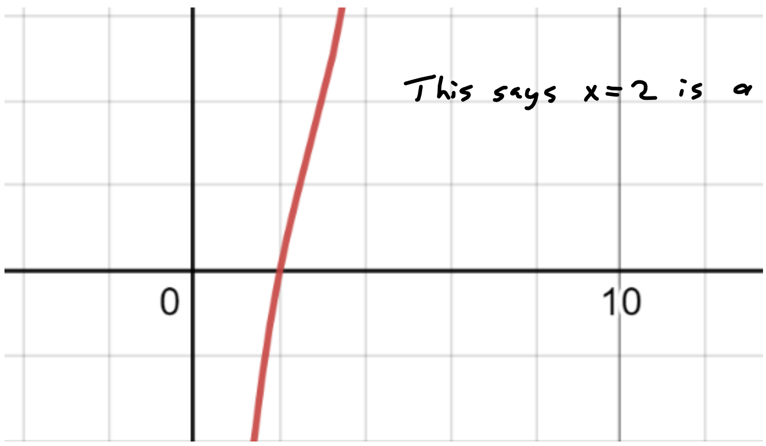
$\Leftrightarrow x = 3+2i, 3-2i, 2$ are zeros

Scratch

$(3+2i)(-5+2i) = -15 + 6i - 10i + 4i^2 = -15-4 -4i = -19-4i$

$(3+2i)(6-4i) = (3+2i)(2)(3-2i) = 2(3+2i)(3-2i) = 2(3^2+2^2) = 2(13) = 26$

In the "real world," they ain't gonna give ya any of the zeros, and you would attack the problem in the following way:



This says $x=2$ is a real root.

$x^3 - 8x^2 + 25x - 26$

2	1	-8	25	-26
		2	-12	26
	1	-6	13	0

sweet!

This says $f(x) = (x-2)(x^2-6x+13)$

Depressed Polynomial

we split of a factor of x-2

Now, $x^2 - 6x + 13 = 0 \Longrightarrow$

$x^2 - 6x + 3^2 = -13 + 9$

$\frac{6}{2} = 3 \rightsquigarrow 3^2$

$(x-3)^2 = -4$

$x - 3 = \pm\sqrt{-4} = \pm 2i$

$\boxed{x = 3 \pm 2i}$

$a = 1,\ b = -6,\ c = 13$

$b^2 - 4ac = 6^2 - 4(1)(13)$

$= 36 - 52$

$= -16 \rightsquigarrow \sqrt{-16} = 4i$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{6 \pm 4i}{2} = \boxed{3 \pm 2i}$

24. 0/1 points LarTrig10 4.2.059. [38

Find a polynomial function with real coefficients that has the given zeros. (There are many correct answers.)

1, $9i$

$(x-1)(x-9i)(x-(-9i))$

$f(x) =$ ✗ $\boxed{x^3 - x^2 + 81x - 81}$

$= x^2(x-1) + 81(x-1)$

$= (x-1)(x^2+81)$

$= (x-1)(x^2-(-81))$

$= (x-1)(x-9i)(x+9i)$

$a^2-b^2=(a-b)(a+b)$

where $b^2=-81$

$b = \pm\sqrt{-81} = \pm 9i$

37. 0/1 points LarTrig10 4.5.005. [38

Use DeMoivre's Theorem to find the indicated power of the complex number. Write the result in standard form.

$[4(\cos 12° + i \sin 12°)]^5$

$512 + 512i\sqrt{3}$

4^5: 16, 64, 256, 1024

$= 4^5(\cos(5 \cdot 12°) + i \sin(5 \cdot 12°))$

$= 1024(\cos 60° + i \sin 60°)$

$= 1024\left(\frac{1}{2} + \frac{\sqrt{3}}{2} i\right)$

$= 512 + 512\sqrt{3}\, i$

38. 0/6 points LarTrig10 4.5.070. [38832

Use the formula $z_k = \sqrt[n]{r}\left(\cos\frac{\theta + 2\pi k}{n} + i\sin\frac{\theta + 2\pi k}{n}\right)$ to find all the solutions of the equation. (Enter your answers in trigonometric form. Let $0 \le \theta < 2\pi$.)

$x^5 - (1 - i) = 0$

$z_0 =$ ✗ $\sqrt[10]{2}\left(\cos\left(\frac{7\pi}{20}\right) + i\sin\left(\frac{7\pi}{20}\right)\right)$

$z_1 =$ ✗ $\sqrt[10]{2}\left(\cos\left(\frac{3\pi}{4}\right) + i\sin\left(\frac{3\pi}{4}\right)\right)$

$\frac{2\pi}{5}\cdot k$ ← $= 0,1,2,3,4$

Increment

Looking for 5^{th} roots of $1-i$

$\frac{2\pi}{5}$ = increment

Need to write $1-i$ in trig form & find r, θ

$\theta = 2\pi - \frac{\pi}{4} = \frac{8\pi - \pi}{4} = \boxed{\frac{7\pi}{4} = \theta}$

$|1-i| = \sqrt{1^2+1^2} = \sqrt{2}$

$z = \sqrt{2}\left(\cos\left(\frac{7\pi}{4}\right) + i\sin\left(\frac{7\pi}{4}\right)\right)$

$K=0$: $\sqrt[5]{z} = \sqrt[5]{\sqrt{2}}\left(\cos\left(\frac{7\pi}{20}\right) + i\sin\left(\frac{7\pi}{20}\right)\right)$,

$\dfrac{\frac{7\pi}{4}}{\frac{5}{1}} = \frac{7\pi}{4}\cdot\frac{1}{5} = \frac{7\pi}{20}$

$K=1$: $\sqrt[10]{2}\left(\cos\left(\frac{3\pi}{4}\right) + i\sin\left(\frac{3\pi}{4}\right)\right)$

$\frac{7\pi}{20} +$ inc. $= \frac{7\pi}{20} + \frac{2\pi}{5}\cdot\frac{4}{4}$

$= \frac{(7+8)\pi}{20} = \frac{15\pi}{20} = \frac{3\pi}{4}$

$K=2$: $\sqrt[10]{2}\left(\cos\left(\frac{23\pi}{20}\right) + i\sin\left(\frac{23\pi}{20}\right)\right)$

$K=3$: $\sqrt[10]{2}\left(\cos\left(\frac{31\pi}{20}\right) + i\sin\left(\frac{31\pi}{20}\right)\right)$

$K=4$: $\sqrt[10]{2}\left(\cos\left(\frac{39\pi}{20}\right) + i\sin\left(\frac{39\pi}{20}\right)\right)$

$15+8=23$
$23+8=31$
$31+8=39$
$39+8=47$

$K=5$: Check $\sqrt[10]{2}\left(\cos\left(\frac{47\pi}{20}\right) + i\sin\left(\frac{47\pi}{20}\right)\right)$

$= \sqrt[10]{2}\left(\cos\left(\frac{7\pi}{20}\right) + i\sin\left(\frac{7\pi}{20}\right)\right)$ ✓

$\frac{47\pi}{20} = \frac{40\pi}{20} + \frac{7\pi}{20} = 2\pi + \frac{7\pi}{20}$?

Yes! We're back home! Sweet!

$\left(2^{\frac{1}{2}}\right)^{\frac{1}{5}} = 2^{\frac{1}{10}}$

$(2^b)^c = 2^{bc}$

I'll keep the session open until 5:30. Go ahead and work on stuff.
If you leave the room, I'll get a bell sound that tells me you're back, and that's as good as asking me out loud.