Today: Review for Test 4. Practice Test 4 is available. We can do some problems from there. Questions?

Test 4 due Thursday, midnight.

I created a Practice Test 4, right before class.... So it's there.

A prime number is divisible only by '1' and itself:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, ...

Simplify $\sqrt{253902416040}$

$2\cdot 3\cdot 7\cdot 13\cdot 23\sqrt{2\cdot 5\cdot 7\cdot 23}$

2 | 253902416040
2 | 126951208020
2 | 63475604010
3 | 31737802005 36
3 | 10579267335
5 | 3526422445
7 | 705284489
7 | 100754927
7 | 14393561
13 | 2056223
13 | 158171
23 | 12167
23 | 529
23

17. 0/1 points LarTrig10 4.2

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

3, 3, 1 + *i*

So $1-i$ is ALSO a zero/root. CONJUGATE PAIRS THEOREM.

FACTOR THEOREM:

$(x-3)^2(x-(1+i))(x-(1-i))$

3 is a zero of multiplicity $m=2$ (It's repeated)

$(x^2-6x+9)(x^2-2x+2)$

$x^4-2x^3+2x^2$

$-6x^3+12x^2-12x$

$+9x^2-18x+18$

$x^4-8x^3+23x^2-30x+18$

Scratch:

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

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

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

$=x^2-2x+1+1=x^2-2x+2$

$(a-bi)(a+bi)$

a^2+b^2

Expanding is tedious, but straightforward

Tortoise beats Hare.

18. 0/1 points LarTrig9 4.2.080. [2456305]

Find a cubic polynomial function f with real coefficients that has the given complex zeros and x-intercept. (There are many correct answers.)

Complex Zeros	x-intercept
$x = -1 \pm \sqrt{2}i$	$(-4, 0)$

$$(x+4)(x-(-1+i\sqrt{2}))(x-(-1-i\sqrt{2}))$$

$$((x+1)-i\sqrt{2})((x+1)+i\sqrt{2}) = (x+1)^2 + \sqrt{2}^2 = x^2+2x+1 + 2 = x^2+2x+3$$

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

$$(x+4)(x^2+2x+3) = x^3+2x^2+3x+4x^2+8x+12$$

$$= x^3+6x^2+11x+12$$

$(8+\sqrt{-12}) - (4+2i\sqrt{3})$

$= 8 + 2i\sqrt{3} - 4 - 2i\sqrt{3}$

$= 4$

$2\,|\,12$, $2\,|\,6$, 3

$4x^2+16x+17=0.$

$a=4, b=16, c=17$

$\Rightarrow b^2-4ac = 16^2-4(4)(17)$

$= 16^2 - 16(17) = 16^2 - 16(16+1)$

$= 16^2 - 16^2 - 16 = -16$

$2\,|\,16$, $2\,|\,8$, $2\,|\,4$, 2 $\qquad \sqrt{16} = 2\cdot 2 = 4$

$\sqrt{-16} = 4i$

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

$= \frac{-16\pm 4i}{2(16)}$

4, you idiot!

$\cancel{\frac{-16+4i}{32} = \frac{-16}{32} + \frac{4}{32}i = -\frac{1}{2} + \frac{1}{8}i}$

$\cancel{\frac{-16-4i}{32} = \frac{-16}{32} - \frac{4i}{32} = -\frac{1}{2} - \frac{1}{8}i}$

$1/2i$ Bad

$\frac{1}{2}i$ Bad

$(1/2)i$ OK

$\frac{i}{2}$ OK

$\frac{1}{2}i$

$\frac{-16\pm 4i}{2(4)} = \frac{4(-4\pm i)}{2(4)} = \frac{-4\pm i}{2}$

$-\frac{4}{2} + \frac{i}{2} = -2 + \frac{1}{2}i$

$-2 - \frac{i}{2} = -2 - \frac{1}{2}i$

MOAR Questions?

If not, you may get rolling on Practice Test 4 & Test 4.

Where you at? You want to ask questions?

4.3 #19

19. 0/4 points LarTrig10 4.4.0

Consider the following.

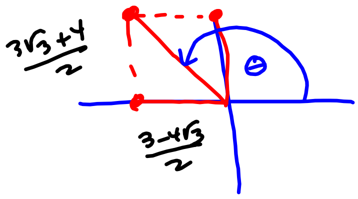
$$\frac{6+8i}{1-\sqrt{3}i}$$

(a) Write the trigonometric forms of the complex numbers. (Let $0 \le \theta < 2\pi$. Round your angles to three decimal places.)

$$\left(\frac{6+8i}{1-\sqrt{3}i}\right)\left(\frac{1+\sqrt{3}i}{1+\sqrt{3}i}\right) = \frac{6+6\sqrt{3}i+8i-8\sqrt{3}}{1+3}$$

$$= \frac{6-8\sqrt{3}+(6\sqrt{3}+8)i}{4}$$

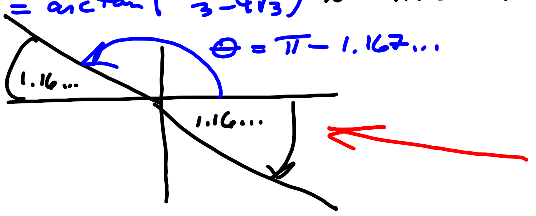
$$= \frac{6-8\sqrt{3}}{4} + \frac{6\sqrt{3}+8}{4}i = \frac{3-4\sqrt{3}}{2} + \frac{3\sqrt{3}+4}{2}i$$

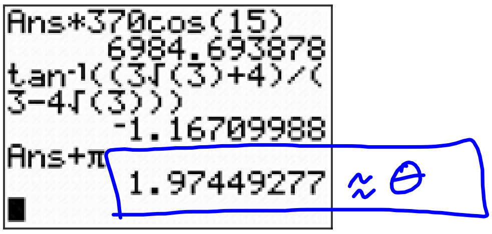


$$\arctan\left(\frac{y}{x}\right) = \arctan\left(\frac{\frac{3\sqrt{3}+4}{2}}{\frac{3-4\sqrt{3}}{2}}\right)$$

$$= \arctan\left(\frac{3\sqrt{3}+4}{3-4\sqrt{3}}\right) \approx -1.16709988$$

$\theta = \pi - 1.167\ldots$





$\approx \theta$

Need $r = \sqrt{a^2+b^2} = \sqrt{\left(\frac{3-4\sqrt{3}}{2}\right)^2 + \left(\frac{3\sqrt{3}+4}{2}\right)^2}$

$$= \sqrt{\frac{3^2-2(3)(4\sqrt{3})+(4\sqrt{3})^2}{4} + \frac{(3\sqrt{3})^2+2(3\sqrt{3})(4)+4^2}{4}}$$

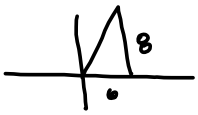
$$= \sqrt{\frac{9-24\sqrt{3}+48}{4} + \frac{27+24\sqrt{3}+16}{4}}$$

$$= \sqrt{\frac{57+43}{4}} = \sqrt{\frac{100}{4}} = \sqrt{25} = 5$$

$\rightarrow$ $z = 5(\cos(1.974) + i\sin(1.974))$ Newp!

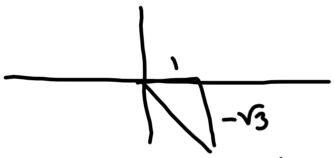
Here's what WebAssign did, which is pretty slick:

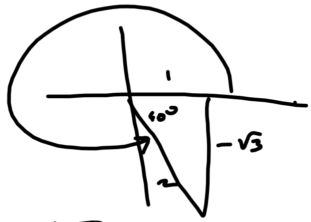
$6+8i$:



$\arctan\left(\frac{8}{6}\right) \approx .92729522$

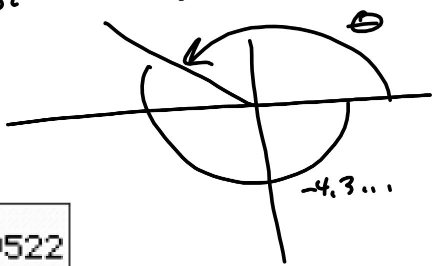
$1-\sqrt{3}\,i$:





$$\arg = 2\pi - \frac{\pi}{3} = \frac{5\pi}{3}$$

$\therefore$ $\frac{8+i}{1-\sqrt{3}\,i}$ has argument $.922\ldots - \frac{5\pi}{3} \approx -4.30869254$

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tan⁻¹(8/6)
        .92729522
Ans-5π/3
      -4.30869254
2π+Ans
       1.97449277
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→ θ !

When dividing complex #s, we subtract angles.

Rather than use arctangent, you may use arccosine/arcsine, since you have to calculate the modulus r, anyway

Nice thing about arccosine is that once we knew we were in QII, we knew that arccosine would give us the angle, without our having to interpret the calculator.