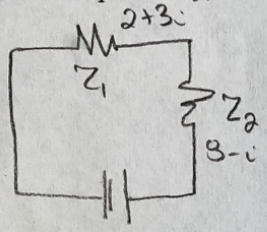
Key

Quiz 2

Show *all* your work. Reasonable supporting work must be shown for any partial credit. There are *two* sides to this quiz.

1. [2] (WebHW6 #8) The total impedance of resistors that are placed in series (one after the other) can be computed by adding the the individual impedance of each resistor in the circuit together. Given there are two resistors Z_1 and Z_2 with resistance $2+3i$ and $8-i$ respectively, find the total impedance of the circuit.

start (+1.5)
add real (+.5)
add im (+.5)
interpret/add (+1.5)



add impedance together
$(2+3i)+(8-i) = 10+2i$

2. (PolynomialRootActivity #5) The volume V and base area B of a cubical prism can be computed as functions of x. Specifically, $V = x^4+3x^3+x+3$ and $B = x^2+4x+3$.

   (a) [1] If $x = 2$, find the volume of cubical prism.

plug in 2 (+.5)

$V = (2)^4 + 3(2)^3 + (2) + 3$
$= 16 + 24 + 5$
$= 45$ (+.5)

   (b) [3] Find the height as a function of x.

(+1.5) Volume = base area · height
$\Rightarrow V = B \cdot \text{height}$
$\Rightarrow \text{height} = \frac{V}{B}$ (+.5)

$\Rightarrow$ height $= x^2 - x + 1$

(+.5) (+.5) (+.5)

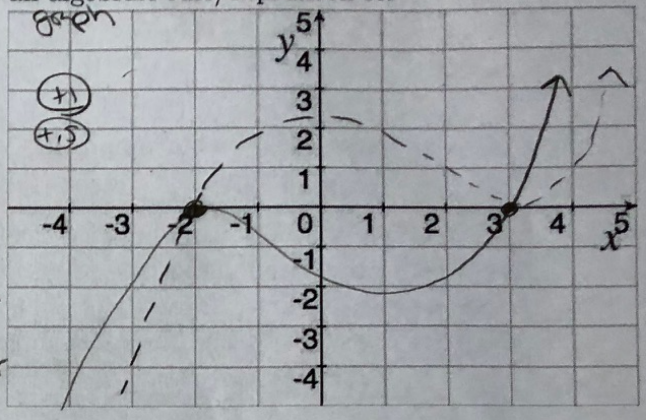
setup (+.5)

$$\begin{array}{r} x^2 - x + 1 \\ x^2+4x+3 \overline{)\, x^4 + 3x^3 + 0x^2 + x + 3} \\ -(x^4 + 4x^3 + 3x^2) \\ \hline -x^3 - 3x^2 + x + 3 \\ -(-x^3 - 4x^2 - 3x) \\ \hline x^2 + 4x + 3 \\ -(x^2 + 4x + 3) \\ \hline 0 \end{array}$$

3. [4] (§2.2 #112) Provide a graph AND an algebraic rule/expression for

- a 3rd degree polynomial
- whose *only* roots are -2 & 3,
- as $x \to \infty$, $y \to \infty$.

graph



(+1) (+1.5)

match (+1.5) polynomial shape (1.5)

(+5) [-2 is a root → (x-2) is a factor
3 is a root → (x-3) is a factor
no more .5

(+.5) 3rd deg polynomial => need to inc multiplicity

dashed line:

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

solid line:

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

rule: there are mult. answers.