MTH 161, Quiz #4, Spring 2021 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Simplify, and write in standard form.
   a. $(-4-8i)(3+i)$

$$-12-4i-24i-8i^2$$
$$+8$$
$$-4-28i$$

   b. $\frac{3-4i}{4+3i} \cdot \frac{4-3i}{4-3i} = \frac{12-9i-16i+12i^2}{16-\cancel{12i}+\cancel{12i}-9i^2} = \frac{-25i}{25} = -i$

$$-12 \qquad +9$$

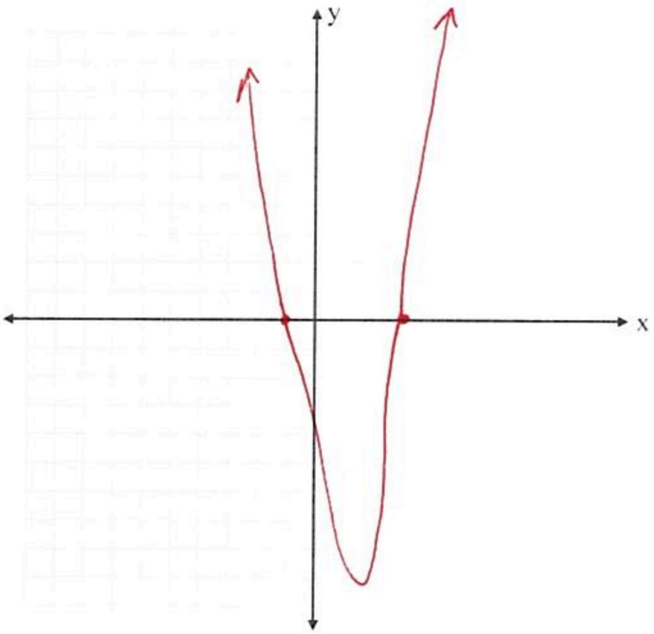
2. One zero of the polynomial equation $x^4-2x^2-16x-15=0$ is $x=3$. Use polynomial division to reduce the polynomial. Then find the rest of the real and complex zeros of the function. You may use the Rational Zero's Theorem and/or The Remainder Theorem. Write the final factored form of the polynomial with linear factors or quadratics with real coefficients (when the roots are complex). Graph the function.

$$\begin{array}{r} x^3+3x^2+7x+5 \\ X-3\overline{)X^4+0x^3-2x^2-16x-15} \\ -X^4+3x^3 \\ \hline 3x^3-2x^2-16x-15 \\ -3x^3+9x^2 \\ \hline 7x^2-16x-15 \\ -7x^2+21x \\ \hline 5x-15 \\ -5x+15 \\ \hline 0 \end{array}$$

$$(X-3)(x^3+3x^2+7x+5)$$

$$\begin{array}{r} x^2+2x+5 \\ X+1\overline{)x^3+3x^2+7x+5} \\ -x^3\mp x^2 \\ \hline 2x^2+7x+5 \\ -2x^2\mp 2x \\ \hline 5x+5 \\ -5x\mp 5 \\ \hline 0 \end{array}$$

Opens up



complex roots

$$(x-3)(x+1)(x^2+2x+5) \qquad x=\frac{-2\pm\sqrt{4-20}}{2} = \frac{-2\pm4i}{2} = -1\pm2i$$