MTH 166, Quiz #3, Fall 2017 Name KEY

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

1. 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).

(3)

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

Rational zeros
$\pm 1, \pm 5$

(-1)

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

graph passes through -1

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

$(x-3)(x+1)(x^2+2x+5)$

$x = \dfrac{-2 \pm \sqrt{4-20}}{2} = \dfrac{-2 \pm 4i}{2} = -1 \pm 2i$

Zeros:

$-1 \pm 2i, -1, 3$

2. Find any asymptotes (vertical, slant or horizontal), along with any intercepts of the function $R(x) = \frac{3x^2+x-4}{2x^2-5x}$. Use that information to sketch the graph of the function.

$\dfrac{(3x+4)(x-1)}{x(2x-5)}$

vertical asymptotes $x=0, x=5/2$

horizontal asymptote $y=3/2$

zeros $x=-4/3, x=1$