

NAME: Solution

MAC 1147 Section 3079  
Quiz Five

Please show all of your work in a NEAT and ORGANIZED fashion.

1. (3 points) Let  $g(x) = x^5 - 4x^4 + 2x^3 - 6x^2 - 1$ . Evaluate  $g(i)$  and write the result in standard form.

$$\begin{aligned}g(i) &= i^5 - 4i^4 + 2i^3 - 6i^2 - 1 \\ &= (i^4)(i) - 4 - 2i - 6(-1) - 1 \\ &= i - 4 - 2i + 6 - 1 \\ &= 1 - i\end{aligned}$$

2. (3 points) Write the polynomial  $f(x) = x^4 - 5x^3 + 8x^2 - 10x + 12$  as a product of linear factors. (Hint: One factor is  $x^2 + 2$ .)

$$\begin{array}{r}x^2 + 2 \overline{) x^4 - 5x^3 + 8x^2 - 10x + 12} \\ \underline{x^4 + 0x^3 + 2x^2} \phantom{- 10x + 12} \\ -5x^3 + 6x^2 - 10x \phantom{+ 12} \\ \underline{-5x^3 + 0x^2 - 10x} \phantom{+ 12} \\ 6x^2 + 12 \\ \underline{6x^2 + 12} \\ 0\end{array}$$

$$\begin{aligned}\text{So } f(x) &= (x^2 + 2)(x^2 - 5x + 6) \\ &= (x^2 + 2)(x - 3)(x - 2) \\ &= (x + i\sqrt{2})(x - i\sqrt{2})(x - 3)(x - 2)\end{aligned}$$

3. (3 points) For the following function, (a) identify all intercepts, and (b) find any vertical or horizontal asymptotes:

$$f(x) = \frac{x^2 - 4}{x^2 - 3x + 2} = \frac{(x+2)(\cancel{x-2})}{(x-1)(\cancel{x-2})}$$

$$\begin{aligned} &= \frac{x+2}{x-1}, \quad x \neq 2 \\ &= \frac{N(x)}{D(x)}\end{aligned}$$

a) x-intercept:  $(-2, 0)$

y-intercept:  $f(0) = \frac{2}{-1} = -2 \rightarrow (0, -2)$

b) Vertical asymptote (when  $D(x) = 0$ ):  $x = 1$

horizontal asymptote:  $y = \frac{1}{1} = 1$