Group Quiz 4
Dusty Wilson
Math 115

KEY

Calculators Allowed

If others would but reflect on mathematical truths as deeply and continuously as I have, they would make my discoveries.

Carl Friedrich Gauss (1777 – 1855)
German mathematician

1.) Factor $P(x) = 2x^5 - 5x^4 + 8x^3 - 7x^2 + 6x - 2$ completely given that $P(-i) = 0$.

$2x^3 - 5x^2 + 6x - 2$
$x^2+1 \;\overline{)\; 2x^5 - 5x^4 + 8x^3 - 7x^2 + 6x - 2}$

$-(2x^5 \quad + 2x^3)$

$-5x^4 + 6x^3$

$-(-5x^4 \quad - 5x^2)$

$6x^3 - 2x^2$

$-(6x^3 \quad + 6x)$

$-2x^2 \quad 0$

$-(-2x^2 \quad - 2)$

0

$\Leftrightarrow x^2+1$ is a factor.

$P(x) = (x+i)(x-i)(2x^3 - 5x^2 + 6x - 2)$

potential rat roots: $\pm 1, \pm 2, \pm \frac{1}{2}$

	2	−5	6	−2
$\frac{1}{2}$	2	−4	4	0

$\Rightarrow P(x) = (x+i)(x-i)(2x-1)(x^2-2x+2)$

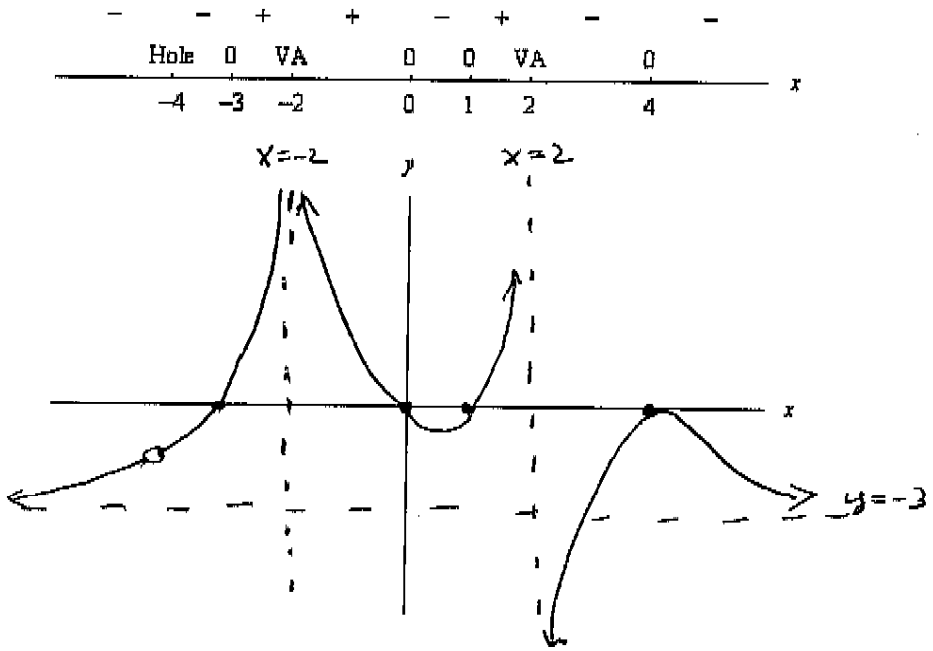
solve $0 = x^2 - 2x + 2$

$x = \frac{2 \pm \sqrt{4-4(1)(2)}}{2(1)}$

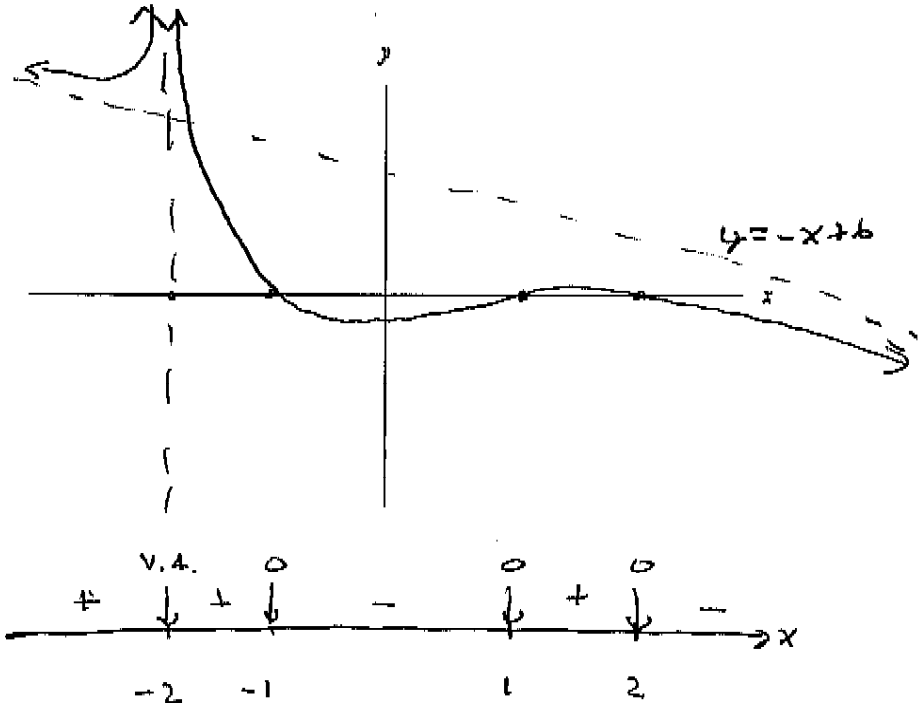
$= 1 \pm i$

$P(x) = (x+i)(x-i)(2x-1)\cdot(x-(1+i))(x-(1-i))$

2.) Sketch a rational function with a horizontal asymptote at $y = -3$ and the given sign diagram.



3.) Sketch a graph of the rational function $f(x)=\dfrac{-x^3+2x^2+x-2}{x^2+4x+4}=\dfrac{-(x+1)(x-1)(x-2)}{(x+2)^2}$. Be sure your graph includes all intercepts, asymptotes, and the appropriate end behavior.



$$x^2+4x+4 \;\overline{)\; -x^3+2x^2+x-2 \;}\;\; -x+6$$

$$-(-x^3-4x^2-4x)$$

$$6x^2$$

oblique asymptote : $y=-x+6$