

121-GII TEST 3 TAKE-HOME

(a)  $p(x) = -2x^6 + \dots$

(b)  $g(x) = 3x^4 + \dots$

(c)  $h(x) = 4x^3 + \dots$

(d)  $f(x) = -4x^5 + \dots$

(2)  $f(x) = x^5 - 7x^4 + 17x^3 - 11x^2 - 16x + 20$

Descartes: 4, 2, or 0 positive roots

$f(-x) = -x^5 - 7x^4 - 17x^3 - 11x^2 + 16x + 20 \Rightarrow$

1 negative root

(3)  $\frac{p}{q} : \pm 1, \pm 2, \pm 4, \pm 5, \pm 10, \pm 20$

(4)

-1	1	-7	17	-11	-16	20
		-1	8	-25	36	-20
2	1	-8	25	-36	20	0
		2	-12	26	-10	
2	1	-6	13	-10	0	
		2	-8	10		
	1	-4	5	0		

$x = -1$   
 $x = 2$  (twice)

$x^2 - 4x + 5 = 0$

$(x-2)^2 = -1$

$x^2 - 4x + 2^2 = -5 + 4$

$x - 2 = \pm i$

$x = 2 \pm i$

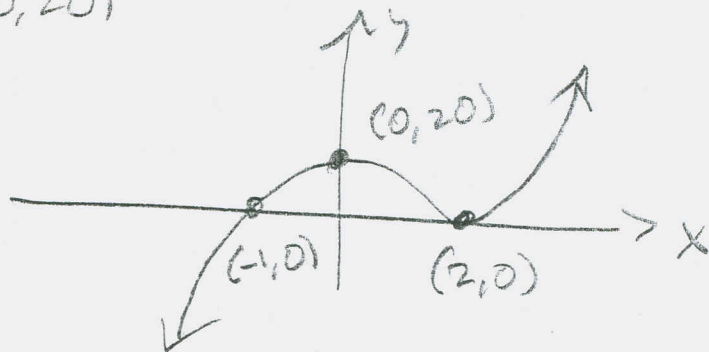
5 (a)  $f(x) = (x+1)(x-2)^2(x^2-4x+5)$

(b)  $f(x) = (x+1)(x-2)^2(x-(2+i))(x-(2-i))$

~~5~~ SKETCH WASNT ASKED  
 $f(0) = 20 \rightarrow (0, 20)$

$x = -1$  cross

$x = 2$  touch



6  $f(x) = (x-2)(x+1)^2(x-3)(x+5) = x^5 + 2x^4 - 18x^3 - 8x^2 + 41x + 30$

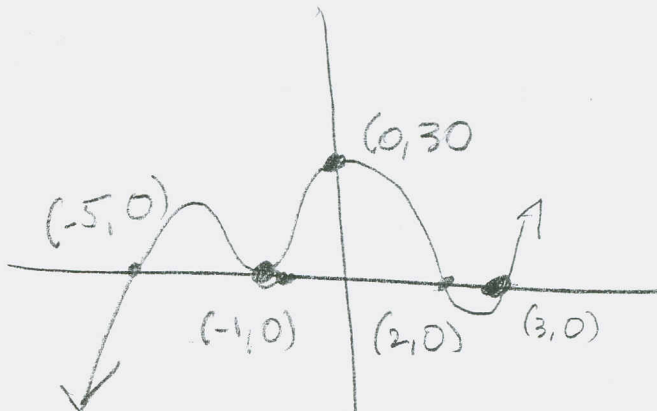
$x = -5$   $m = 1$  cross  $x = 2$   $m = 1$  cross

$x = -1$   $m = 2$  touch

$x = 3$   $m = 1$  cross

$f(0) = 30 \rightarrow (0, 30)$

E.B.:  $x^5$  ↘ ↗



7  $h(x) = \frac{(x+1)^2(x-2)^2}{(x-3)(x+5)(x-2)} = \frac{(x+1)^2(x-2)}{(x-3)(x+5)} = \frac{x^4 - 2x^3 - 3x^2 + 4x + 4}{x^3 - 19x + 30}$

Domain:  $\mathbb{R} \setminus \{-5, 2, 3\}$

V.A.:  $x = -5, x = 3$

HOLE:  $(2, 0)$

zeros:  $x = -1$  touch  
 $x = 2$  cross (hole)

$x-2 \rightarrow$  S.A.:  $y = x-2$

$$\begin{array}{r} x^4 - 2x^3 - 3x^2 + 4x + 4 \\ -(x^4 - 19x^2 + 30x) \\ \hline -2x^3 + 16x^2 - 26x + 4 \end{array}$$

121 - G11

# TAKE-HOME TEST 3

