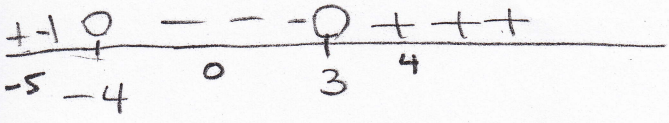
#115 p103# 1-7(0)

① $(x-3)(x+4) > 0$

Test 4: $(4-3)(4+4) \to +$

Test 0: $(0-3)(0+4)$ $- \quad + \to -$

Test -5: $(-5-3)(-5+4)$ $- \quad - \to +$



open circle because $>$ (no $=$)

$>0 \to$ check $+++$ region

$\boxed{x > 3 \text{ or } x < -4}$

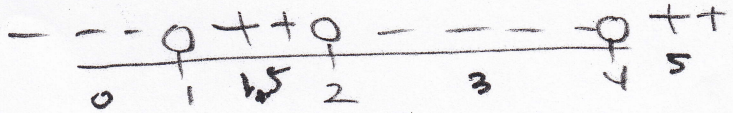
③ $(x-1)(x-2)(x-4) > 0$ → open circle

Test 5: $(5-1)(5-2)(5-4) \to +$

Test 3: $(3-1)(3-2)(3-4) \to -$

Test 1.5: $(1.5-1)(1.5-2)(1.5-4)$ $+ \quad - \quad - \to +$

Test 0: $(0-1)(0-2)(0-4)$ $- \quad - \quad - \to -$



$>0 \to ++$ region

$\boxed{1 < x < 2 \text{ or } x > 4}$

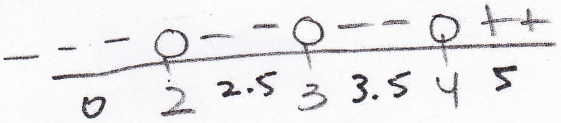
⑤ $(x-4)(x-2)^2(x-3)^2 < 0$ → open circle

Test 5: $(5-4)(5-2)^2(5-3)^2 \to +$

Test 3.5: $(3.5-4)(3.5-2)^2(3.5-3)^2$ $- \quad + \quad + \to -$

Test 2.5: $(2.5-4)(2.5-2)^2(2.5-3)^2$ $- \quad + \quad + \to -$

Test 0: $(0-4)(0-2)^2(0-3)^2$ $- \quad + \quad + \to -$



$\boxed{x < 2 \text{ or } 2 < x < 3 \text{ or } 3 < x < 4}$

$\boxed{\text{Or } x < 4 \; ; \; x \neq 2 \; ; \; x \neq 3}$

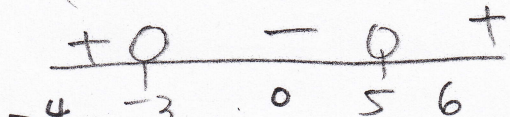
⑦ $x^2 - 2x - 15 < 0$

$(x-5)(x+3) < 0$

Test 6: $(6-5)(6+3) \to +$

Test 0: $(0-5)(0+3) \to -$

Test -4: $(-4-5)(-4+3)$ $- \quad - \to +$



$\boxed{-3 < x < 5}$

(13) $x^4 - 3x^2 - 10 > 0$ let $m = x^2$

$m^2 - 3m - 10 > 0$

$(m-5)(m+2) > 0$

$(x^2-5)(x^2+2) > 0$

$(x+\sqrt{5})(x-\sqrt{5})(x^2+2) > 0$

$x^2+2=0 \to x^2 = -2 \to x = \pm i\sqrt{2} \to$ not critical pts

+ o − o +

−3 $-\sqrt{5}$ 0 $\sqrt{5}$ 3

$\sqrt{5} \approx 2..$

Test 3 : $(3+\sqrt{5})(3-\sqrt{5})$ (+)

0 $(0+\sqrt{5})(0-\sqrt{5})$ (−)

−3 $(-3+\sqrt{5})(-3-\sqrt{5})$ (+)

$x > \sqrt{5}$ or $x < -\sqrt{5}$

(15) $a^3 + 2a^2 - 4a - 8 > 0$

$a^2(a+2) - 4(a+2) > 0$

$(a^2-4)(a+2) > 0$

$(a+2)(a-2)(a+2) > 0$

$(a+2)^2(a-2) > 0$

− − o − − o + +

−3 −2 0 2 3

Test 3 $(3+2)^2(3-2)$ (+)

0 $(0+2)^2(0-2)$ (−)

−3 $(-3+2)^2(-3-2)$ (−)

$a > 2$

(19) $2x^3 + x^2 - 5x < -2 \to 2x^3 + x^2 - 5x + 2 < 0$

$(x-1)(2x-1)(x+2) < 0$

1	$2x^3$	1	−5	2
		2	3	−2
	$2x^2$	$+3x$	−2	0

$2x \quad -1$

$x \quad +2$

− o + o − o +

−3 −2 0 $\frac{1}{2}$ $\frac{3}{4}$ 1 2

Test 2 : + + + → +

$\frac{3}{4}$ − + + → −

0 − − + → +

−3 − − − → −

$x < -2$ or $\frac{1}{2} < x < 1$

(23) $4x^4-4x^3-3x^2+4x-1>0$ can't factor by grouping 11/5/3

	$4x^4$	-4	-3	4	-1
1		4	0	-3	1
	$4x^3$	0	-3	1	0
-1		-4	4	-1	
	$4x^2$	$-4x$	$+1$	0	
	$2x$		-1		
	$2x$		-1		

→ 1 is a zero → $(x-1)$ is a factor

→ -1 is a zero → $(x+1)$ is a factor

$(2x-1)^2$

$4x^4-4x^3-3x^2+4x-1=$
$(2x-1)^2(x+1)(x-1)$

+ + + 0 − − − 0 − − 0 + + +

-2 -1 0 $\frac{1}{2}$ $\frac{3}{4}$ 1 2

Test

2 + + + → +

$\frac{3}{4}$ + + − → −

0 + + − → −

-2 + − − → +

$x<-1$ or $x>1$

(25) $\frac{(x-3)(x-4)}{(x-5)(x-6)^2}<0$

Test 7 $\frac{+\,+}{+\,+}=\oplus$

5.5 $\frac{+\,+}{+\,+}\oplus$

4.5 $\frac{+\,+}{-\,+}\ominus$

3.5 $\frac{+\,-}{-\,+}\oplus$

2 $\frac{-\,-}{-\,+}\ominus$

− + − +

2 3 3.5 4 4.5 5 5.5 6 7 +

$x<3$ or $4<x<5$

(27) $\frac{(2x-5)^3}{x^2-3x-28}=\frac{(2x-5)^3}{(x-7)(x+4)}\geq 0$

numerator must be 0 denominator ≠0

− 0 + 0 − 0 +

-5 -4 0 $\frac{5}{2}$ 6 7 8

8 $\frac{+}{+\,+}\oplus$

6 $\frac{+}{-\,+}\ominus$

0 $\frac{-}{-\,+}\oplus$

-5 $\frac{-}{-\,-}=\oplus$

$x>7$ or $-4<x\leq\frac{5}{2}$

p99

(18) $|x+2| < -1$ → no solutions
absolute value has to be pos & can't be less than a negative #

(23) $|4x+8| \leq 9$

$-9 \leq 4x+8 \leq 9$
$-8 \quad -8 \quad -8$

$\frac{-17}{4} \leq \frac{4x}{4} \leq \frac{1}{4} \rightarrow -\frac{17}{4} \leq x \leq \frac{1}{4}$

(28) $2 < |x-6| \leq 5$

AND

$|x-6| \leq 5$

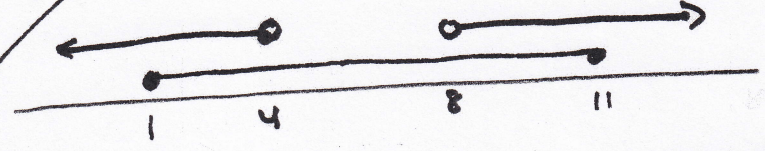
$-5 \leq x-6 \leq 5$
$+6 \quad +6 \quad +6$

$1 \leq x \leq 11$

$|x-6| > 2$

$x-6 > 2$ or $x-6 < -2$
$+6 \quad +6 \quad +6 \quad +6$

$x > 8$ or $x < 4$



AND means regions w/ red and purple

$1 \leq x < 4$ or $8 < x \leq 11$

final graph