

MC

1. D	5. B	9. B
2. A	6. A	10. C
3. D	7. B	11. B
4. C	8. omit	12. A

Part B:

$$\begin{aligned} 1. P(-1) &= (-1)^3 + 2(-1)^2 + 3(-1) + 2 \\ &= -1 + 2 - 3 + 2 \\ &= 0 \end{aligned}$$

2. (a) $x^4 - x^3 - 2x^2$
 $x^2(x^2 - x - 2)$
 $x^2(x-2)(x+1)$

(b) $x^3 + 5x^2 - 12$

$P(1) = -6$
 $P(-1) = -8$
 $P(2) = 16$
 $P(-2) = 0 \checkmark$

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

$(x+2)(x^2 + 3x - 6)$
 ↑ this will not factor

(c) $15x^4 - 22x^2 + 8$

add -22
mult 120

(You do not need to do this one)

$$15x^4 - 12x^2 - 10x^2 + 8$$

$$3x^2(5x^2 - 4) - 2(5x^2 - 4)$$

$$(5x^2 - 4)(3x^2 - 2)$$

(d) $6x^4 + 13x^3 - 8x^2 - 17x + 6$

$P(1) = 0$

$$\begin{array}{r} 6x^3 + 19x^2 + 11x - 6 \\ x-1 \overline{) 6x^4 + 13x^3 - 8x^2 - 17x + 6} \\ \underline{6x^4 - 6x^3} \\ 19x^3 - 8x^2 \\ \underline{19x^3 - 19x^2} \\ 11x^2 - 17x \\ \underline{11x^2 - 11x} \\ -6x + 6 \\ \underline{-6x + 6} \\ 0 \end{array}$$

Factors:

$(x-1)(x+2)(6x^2+7x-3)$

\downarrow
 $6x^2+9x-2x-3$
 $3x(2x+3)-1(2x+3)$
 $(2x+3)(3x-1)$

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

OR

-1	6	13	-8	-17	6
	↓	-6	-19	-11	6
	6	19	11	-6	0

$(x-1)(6x^3+19x^2+11x-6)$

\uparrow
 $P(-2) = 0$

$$\begin{array}{r} 6x^2 + 7x - 3 \\ x+2 \overline{) 6x^3 + 19x^2 + 11x - 6} \\ \underline{6x^3 + 12x^2} \\ 7x^2 + 11x \\ \underline{7x^2 + 14x} \\ -3x - 6 \\ \underline{-3x - 6} \\ 0 \end{array}$$

(e) $125x^3 - y^3$ (Diff. of Cubes)
 $(5x - y)(25x^2 + 5xy + y^2)$

(f) $24x^4b^4 + 54xy$
 $6x(4x^3b^4 + 9y)$

(g) $x^3 - 17x^2 + 80x - 100$
 $(x - 2)(x - 5)(x - 10)$

3. $f(x) = 2x^4 + 3x^3 - x^2 - 3x - 1$
 $f(x) = (x+1)^2(x-1)(2x+1)$
 x-int: $-1, 1, -\frac{1}{2}$

4. Solve:

(a) $(x-3)^2(x+4)(x+6) \geq 0$
 chart

zeros: $3, -4, -6$

	$(x-3)^2(x+4)(x+6)$			≥ 0
$(-\infty, -6]$	+	-	-	+
$[-6, -4]$	+	-	+	-
$[-4, 3]$	+	+	+	+
$[3, \infty)$	+	+	+	+

sol'n
 $(-\infty, -6] [-4, 3] [3, \infty)$

4. (b) $2x^3 + 7x^2 - 10x - 24 < 0$

factor: $(x-2)(x+4)(2x+3) < 0$
 $x = 2, -4, -3/2$

	$(x-2)$	$(x+4)$	$(2x+3)$	< 0
$(-\infty, -4)$	-	-	-	-
$(-4, -3/2)$	-	+	-	+
$(-3/2, 2)$	-	+	+	-
$(2, \infty)$	+	+	+	+

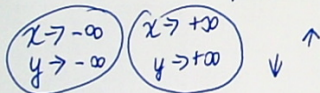
Sol'n: $(-\infty, -4) \cup (-3/2, 2)$

5. $y = (x+4)^2(x-1)^2(x+1)$

(a) degree 5

(b) 4 possible turn-points

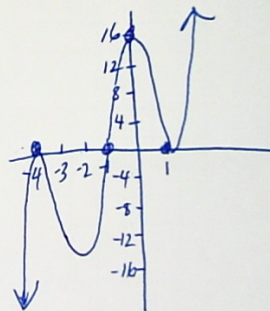
(c) head term: x^5 odd positive



(d) zeros: $-4, 1, -1$

	$(x+4)^2$	$(x-1)^2$	$(x+1)$	
$(-\infty, -4)$	+	+	-	-
$(-4, -1)$	+	+	-	-
$(-1, 1)$	+	+	+	+
$(1, \infty)$	+	+	+	+

(e) x-int: $-4, 1, -1$
 y-int: 16



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

a) Degree: 4

b) possible turn pts: 3

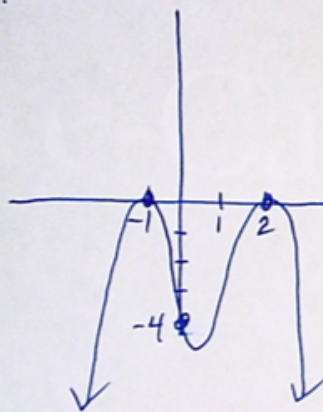
c) End Beh: lead term $-x^4$ neg even

$x \rightarrow -\infty$ $y \rightarrow -\infty$ $x \rightarrow +\infty$ $y \rightarrow -\infty$ \downarrow \downarrow

(d)

	$-1(x+1)^2(x-2)^2$			
$(-\infty, -1)$	-	+	+	- always negative
$(-1, 2)$	-	+	+	-
$(2, \infty)$	-	+	+	-

(e)



x -int: -1, 2
 Just Touch Just Touch
 y -int: -4

7. (a) $y = a(x+3)(x-1)(x-7)$

$30 = a(2+3)(2-1)(2-7)$

$30 = a(5)(1)(-5)$

$30 = -25a$

$\frac{30}{-25} = a$

$-6/5 = a$

OR -1.2

$y = -\frac{6}{5}(x+3)(x-1)(x-7)$

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

$20 = a(0+5)(0+1)^2(0-2)(0-4)$

$20 = a(5)(1)^2(-2)(-4)$

$20 = 40a$

$\frac{20}{40} = a$

$a = \frac{1}{2}$

$y = \frac{1}{2}(x+5)(x+1)^2(x-2)(x-4)$

Test tomorrow:

Review Page 153: 1-11 (omit 4)
from book: Page 155-156: 1-4, 6-8
 Page 148: 3