121-G81

3.1 #43
#99 in text.

AD

(a) EB
(b) x- & y-int
(c) zeros
(d) Max # turning points
(e) Behavior near x-int.
(f) Sketch

$f(x) = x^4 + 6x^3 - 4x^2 - 24x$

$= x(x^3 + 6x^2 - 4x - 24)$

Factors by grouping:

$= x(x^2(x+6) - 4(x+6))$

$= x(x+6)(x^2-4)$

$= x(x+6)(x+2)(x-2)$

(a) $y = x^4$

(b) $f(0) = 0 \rightsquigarrow (0,0)$ is y-int

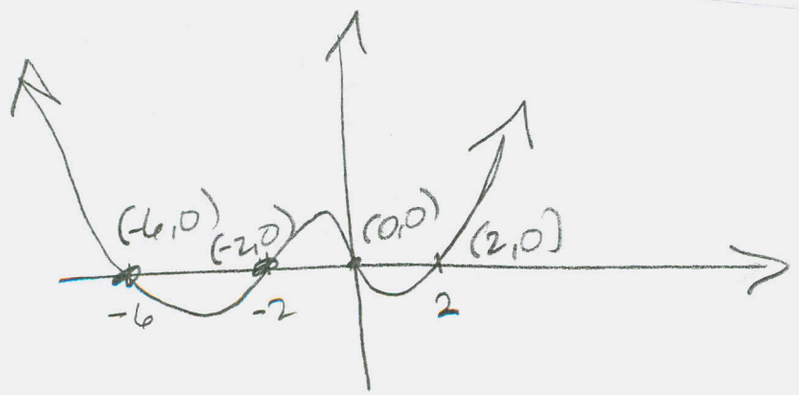
x-int: $(0,0), (-6,0), (-2,0)(2,0)$

(c) zeros: $x = 0, -6, -2, 2$
$m = 1, 1, 1, 1$

(d) $n = 4 \Rightarrow n-1 = 3 =$ max # of turning points.

(e) Because $m = 1 =$ multiplicity, $f(x)$ crosses the x-axis at each x-intercept.

(f)



Now on part e:

Near $x = -6$:

$f(x) = x(x+6)(x+2)(x-2)$ looks like

$-6(x+6)(-6+2)(-6-2)$

$= -6(-4)(-8)(x+6)$

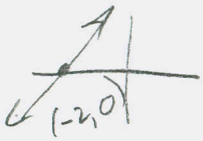
$= -192(x+6)$

$3 \cdot 24$
8
192

Near $x = -2$:

$-2(-2+6)(x+2)(-2-2) = -2(4)(-4)(x+2)$

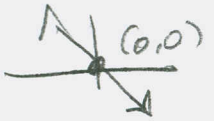
$= 32(x+2)$



Near $x = 0$:

$x(0+6)(0+2)(0-2) = x(6)(2)(-2) =$

$-24x$



Near $x = 2$:

$2(2+6)(2+2)(x-2) = (2)(8)(4)(x-2) = 64(x-2)$