

#40.

$$f(x) = \frac{-x^2}{3} + 2x + 7$$

$$\left[\frac{1}{2}(-6)\right]^2$$

$$(-3)^2$$

$$= -\frac{1}{3} \left(x^2 - 6x + \frac{9}{1} \right) + 7 + 3$$

$$= -\frac{1}{3} (x - 3)^2 + 10$$



#48.

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

D: \mathbb{R}

$$\left[\frac{1}{2}(-2)\right]^2$$

(1, 7)

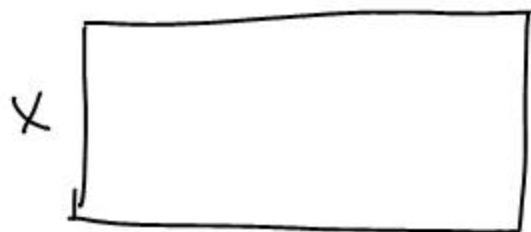


$$= -3(x^2 - 2x + 1) + 4 + 3$$

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

R: $(-\infty, 7]$

#75



1200 - x

$$A(x) = x(1200 - x)$$

$$A(x) = 1200x - x^2$$

$$= -\left(x^2 - 1200x + 36000\right) + 360000$$

$$= -\left(x - 600\right)^2 + 360000$$

$$\left. \begin{array}{l} x = 600 \\ 1200 - x = 600 \end{array} \right\}$$

$$\left[\frac{1}{2}(1200)\right]^2$$

$$600^2$$

$$360000$$

#18. $f(x) = -3x^2 + 6x - 2$

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

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

vertex (1, 1)

$$0 = -3(x-1)^2 + 1$$

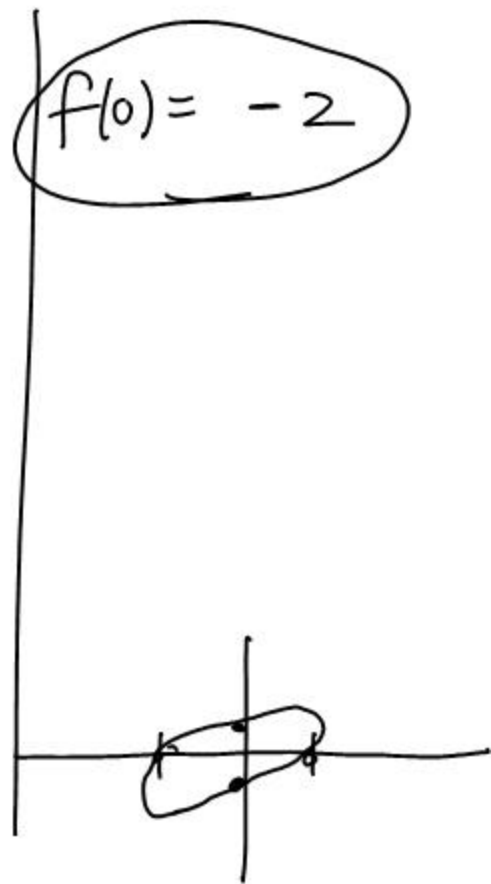
$$-1 = -3(x-1)^2$$

$$\frac{1}{3} = (x-1)^2$$

$$\pm \sqrt{\frac{1}{3}} = x-1$$

$$1 \pm \sqrt{\frac{1}{3}} = x$$

$$f(0) = -2$$



$$x^2 - xy + 2y^2 = 1$$

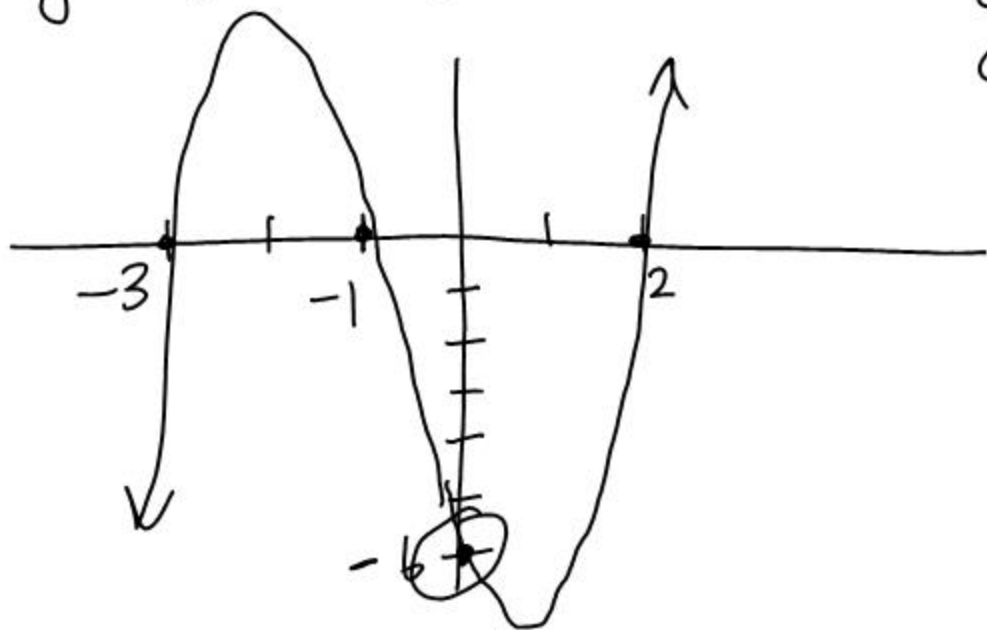
$$x^2 - 0 + 0 = 1 \rightarrow x = \pm 1$$

$$0^2 - 0 + 2y^2 = 1 \rightarrow y = \pm \frac{1}{\sqrt{2}}$$

Sketching Polynomials

Ex. A cubic parabola

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



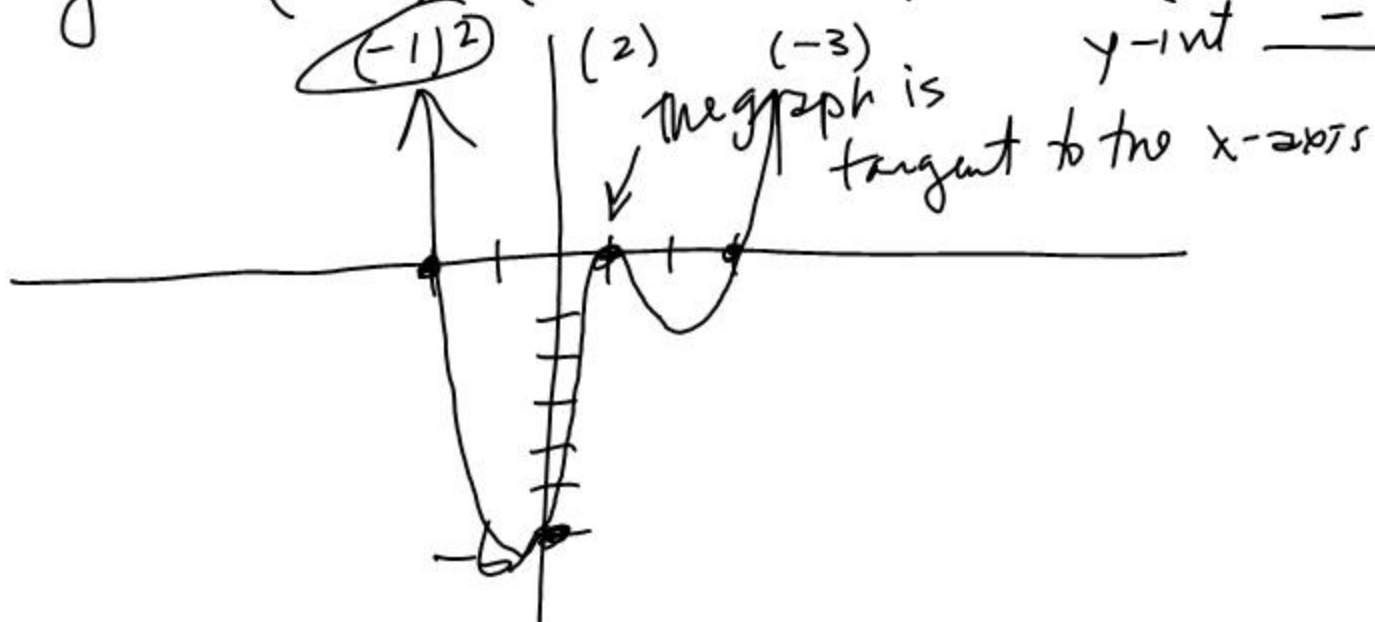
$$x\text{-int } \underline{-1, 2, -3}$$

$$y\text{-int } \underline{-6}$$

2 turns
or no turns

Ex. A quartic parabola

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



$$x\text{-int } \underline{1, -2, 3}$$

$$y\text{-int } \underline{-6}$$

*
the graph is tangent to the x-axis

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

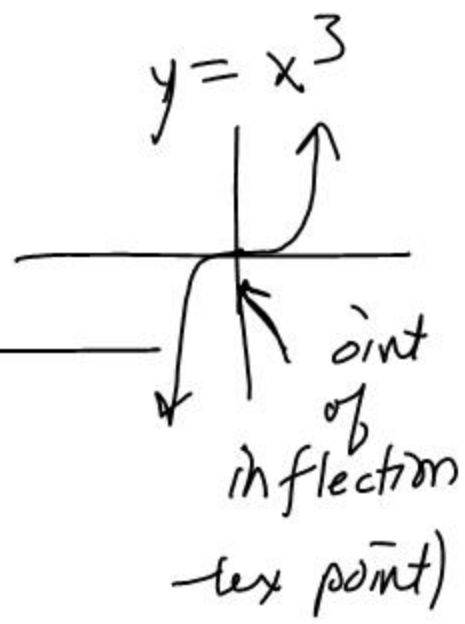
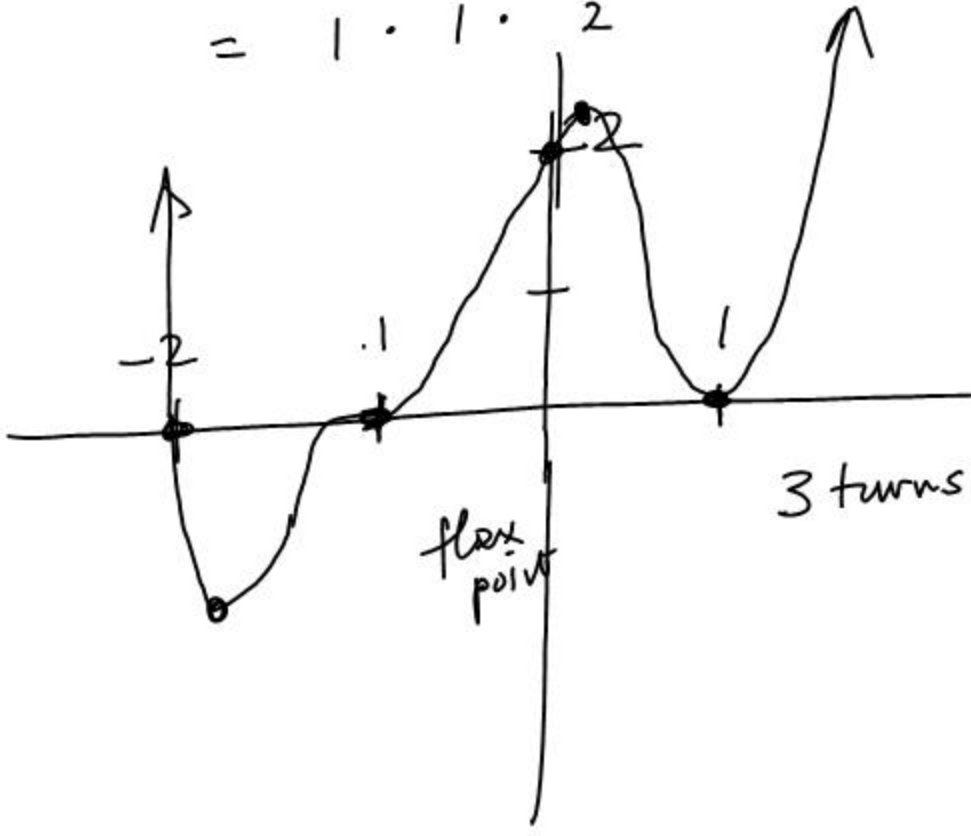
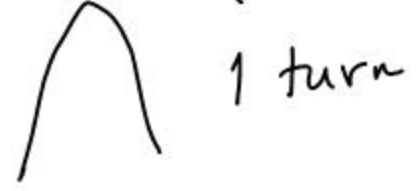
6th degree polynomial

x-int $-1, 1, 2$

y-int 2

$$= (0+1)^3 (0-1)^2 (0+2)$$

$$= 1 \cdot 1 \cdot 2$$



Ex. Sketch $y = x^3 + x^2 - x - 1$

#33

x-int: $0 = \underbrace{x^3 + x^2 - x - 1}$

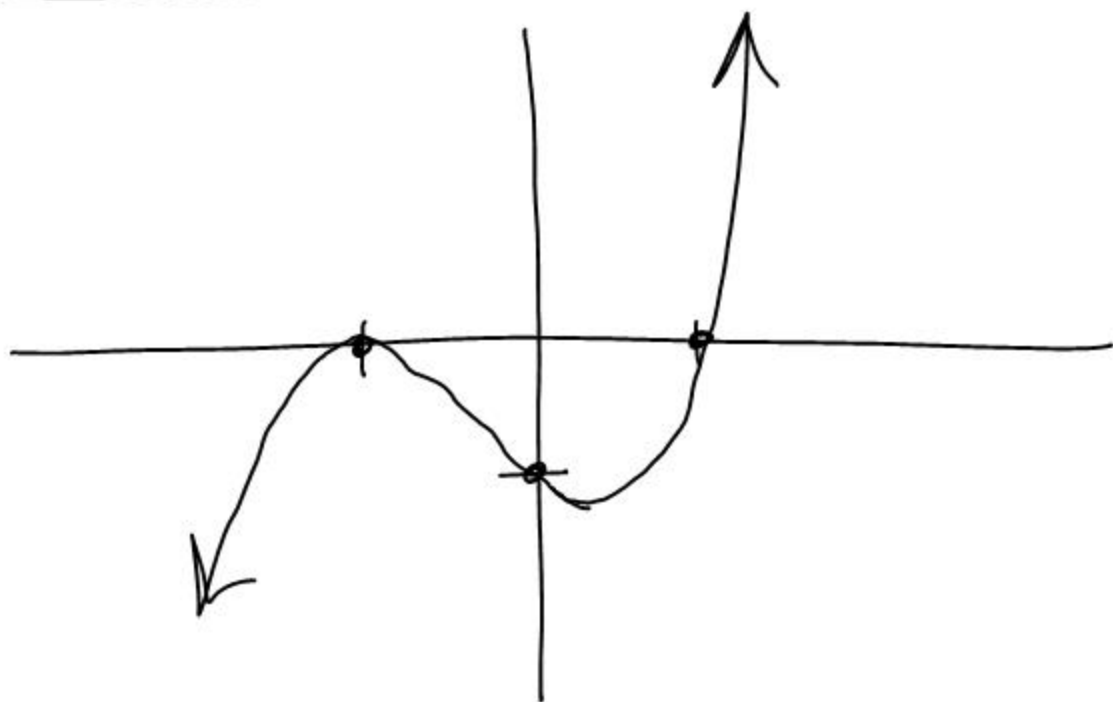
$y = \underbrace{(x+1)^2}(x-1)$ $0 = x^2 \underline{(x+1)} - \underline{(x+1)}$

$$0 = (x+1)(x^2 - 1)$$

$$0 = (x+1)(x+1)(x-1)$$

$x = \pm 1$

y -int: -1



How to factor if you can't use grouping

Ex. $f(x) = x^3 + 2x^2 - 3x - 10$

$$\begin{array}{r|rrrr} 2 & & 2 & -3 & -10 \end{array}$$

~~$x + 1$~~

~~$x + 2$~~

$x + 2$

$x - 2$

HW p. 244

16, 19, 21, 22, 23, 25, 26

31, 32, 34, 35 ← do your own

factoring
