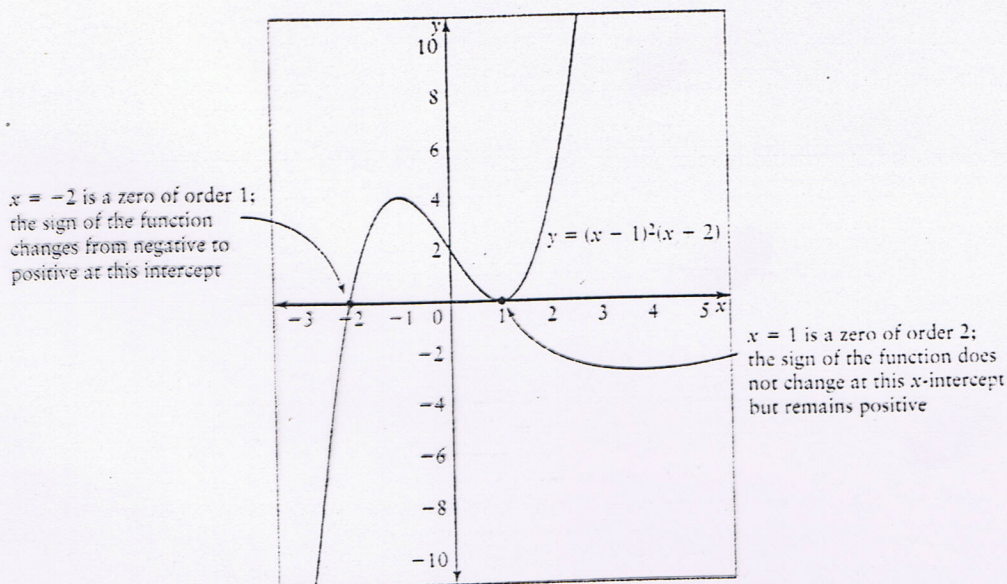


If a polynomial function has a factor $(x - a)$ that is repeated n times, then $x = a$ is a zero of order n .
 The function $f(x) = (x - 2)(x + 1)^2$ has a **order 2** at $x = -1$
 and the equation $(x - 2)(x + 1)^2 = 0$ has a **double root** at $x = -1$

The graph of a polynomial function changes sign (from positive to negative or negative to positive) at zeros that are of odd order but does not change sign at the zeros that are of even order.



Example: For the given polynomial function: **pg 33 (b)**

- the least possible degree is **4**.
- the x -intercepts are: **-2, 1, 3 (double)**
- the factors of the function: **$(x+2), (x-1), (x-3)^2$**
- The intervals where the function is positive and the intervals where it is negative.

Interval	$x < -2$	$-2 < x < 1$	$1 < x < 3$	$x > 3$
Sign of $f(x)$	+	-	+	+

- Determine the equation of the polynomial.

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

Sub $(0, -20)$

$$-20 = a(0+2)(0-1)(0-3)^2$$

$$-20 = a(18)$$

$$\frac{10}{9} = a$$

$$\text{so } y = \frac{10}{9}(x+2)(x-1)(x-3)^2$$