Sketch the graph of

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

① Degree: thinking about expansion of $(x+2)^4$, the term with highest exponent is 4; for expansion of $(x-3)^3$ the term with highest exponent is 3.

multiplying terms with highest exponents in expansions of each factor: x, $(x+2)^4$, $(x-3)^3$

we get highest overall exponent of 8 on x: $x \cdot x^4 \cdot x^3 = x^8$

$\boxed{\text{degree} = 8}$

→ even degree: same end behaviour

② Leading Coefficient: $a = 1 > 0$

QII to QI

Actual End Behaviour:

As $x \to +\infty$, $y \to +\infty$

As $x \to -\infty$, $y \to +\infty$

③ Zeroes: $0 = x(x+2)^4(x-3)^3$

$x = 0$ or $(x+2)^4 = 0$ or $(x-3)^3 = 0$

$\boxed{x=0}$ or $x+2=0$ or $x-3=0$

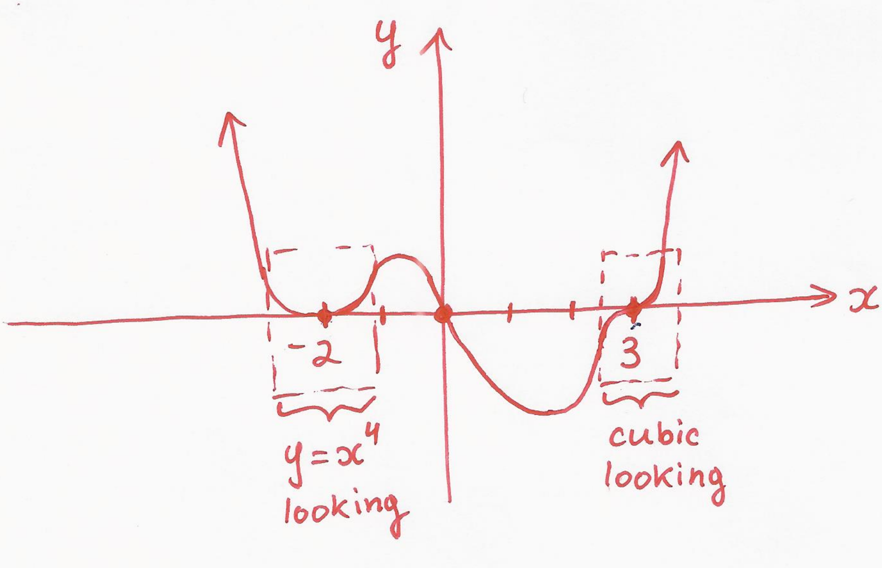
$\boxed{x=-2}$ $\boxed{x=3}$

④ y-intercept: set $x=0$, $f(0) = (0)(0+2)^4(0-3)^3 = 0$

$\boxed{x=-2 \text{ is root of order } 4}$

$y = x^{①}(x+2)^{④}(x-3)^{③}$

$\boxed{x=0 \text{ is root of order } 1}$



around $x=0$, graph looks linear, goes through;

around $x=-2$ graph looks quartic, bounces off