Ex 3 For $y = x^2 - 3$, find $\Delta y$ and $dy$ for $x = 3$ and $dx = \Delta x = -0.12$

Ex 4 All six sides of a cubical metal box are 1/4 inch thick, and the interior volume is 40 in$^3$. Use differentials to find the approximate volume of metal used to make the box.

# 3.1 Practice (maxima/minima)

**Ex 1** Find all critical pts for $f(x) = x^5 - \frac{25}{3}x^3 + 20x - 1$ on $[-3, 2]$. Identify min & max values.

**Critical pts**

1. stationary pts
2. singular pts
3. endpts

Ex 2 Find min and max pts, for

$$f(x) = \frac{1}{1+x^2} \quad \text{on} \quad [-3, 1]$$

Ex 3 Under what conditions are we guaranteed min and max pts?

Ex 4 Sketch a graph of a function that meets these conditions.

- f continuous
- f is not necessarily differentiable
- domain of $[0, 6]$
- max value of 4 (at $x = 3$)
- min value of 2 (at $x = 1$)
- f has no stationary pts.