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Analysis I
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Day 6 — Summary — Convexity, Inverse Function Theorem

34. A function is convex if for all $t \in (0, 1)$ and for all points a and b ,

$$f\left((1-t)a + tb\right) \leq (1-t)f(a) + tf(b).$$

It is strictly convex if this inequality is strict.

35. If $f''(x) > 0$ in an interval, then f is strictly convex in the interval.

36. A continuous, strictly increasing function has an inverse that is continuous and strictly increasing.

37. A differentiable, strictly increasing function has an inverse that is differentiable and strictly increasing.
The derivative of the inverse is the inverse of the derivative:

$$\frac{dy}{dx}(x) = \left(\frac{dx}{dy}(y)\right)^{-1}$$