MAT137

(Section L0501, November 25, 2019)

- **For next day's lecture, watch videos 6.3 – 6.10.**
- Today's lecture will **assume** you have watched videos 6.1, 6.2.
- Contents: Optimization.

Recap: Intervals of monotonicity

Let $g(x) = x^3(x^2 - 4)^{1/3}$.

Find out on which intervals this function is increasing or decreasing.
Using that information, sketch its graph.

To save time, here is the first derivative:

$$g'(x) = \frac{x^2(11x^2 - 36)}{3(x^2 - 4)^{2/3}}$$

The classic farmer problem

A farmer has 300 m of fencing and wants to fence off a rectangular field and add an extra fence that divides the rectangular area in two equal parts down the middle.

What is the largest area that the field can have?

Distance

Find the point on the parabola $y^2 = 2x$ that is closest to the point $(1, 4)$.

Fire

You hear a scream. You turn around and you see Asif is on fire. Literally. Luckily, you are next to a river.

Asif is 10 meters away from the river and you are 5 meters away from the point P on the river closest to Asif. You are carrying an empty bucket. You can run twice as fast with an empty bucket as you can run with a full bucket.

How far from the point P should you fill your bucket in order to get to Asif with a bucket full of water as fast as possible?