

Homework (analysis): set 4.

1. Find the intervals of increase/decrease and extrema of $f(x) = \frac{x}{x^2+4}$.
2. A sheet of cardboard 30 cm by 40 cm will be made into a box by cutting equal-sized squares from each corner and folding up the four edges. What will be the dimensions of the box with largest volume ?
3. Find intervals of concavity and inflection points of $f(x) = x^2 \ln x$. (Remember about the domain).
4. (Related rates) A water tank in the shape of a right circular cone has a height of 10 m. The top rim of the tank is a circle with a radius of 4 m. If water is being pumped into the tank at the rate of $2 \text{ m}^3/\text{min}$, what is the rate of change of the water depth, in meters per minute, when the depth is 5 meters?
5. Find $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{x - \sin x}$.

Give me the solutions not later than 19/12/2018, please.