

Long Weekend Bonus Assignment

1. Find the interval on which the function $f(x) = \frac{x}{x^2+1}$ is increasing.
2. Find the absolute maximum and minimum values of the function $f(x) = x^3 + 2x^2 + x - 1$, $-1 \leq x \leq 1$.
3. For the function $f(x) = x^4 - 8x^2 + 3$,
 - a) Find the critical numbers.
 - b) Find the intervals of increase and decrease.
 - c) Find the local maximum and minimum values.
4. A box is built with a square base and open top. Material for the base cost \$4/square metre, while the material for the sides costs \$2/square metre. Find the dimensions of the box of **maximum volume** that can be built for \$1200.
5. A company estimates that the cost, in dollars, of producing x items is $C(x) = 16\,000 + 22.5x + 0.004x^2$
At what production level will the average cost be lowest (Hint: Average cost is the cost \div the number of items produced)
6. An apple orchard now has 80 trees planted per hectare and the average yield is 400 apples per tree. For each additional tree planted per hectare the average yield per tree reduced by four apples. How many trees per hectare will give the largest crop of apples?