MATH 1401A **Tutorial #1** **18 May 2017**

Please work in teams of 2-3. At the end of the tutorial every team hands in **one** set of solutions with everybody's name and student number PRINTED, and everybody's signature.

Don't worry if you can't finish all the questions; what you haven't finished in class, finish at home (I will post the tutorial, with solution, in CULearn). The main goal of the tutorial is to learn by working together. The tutorial problems are intended to be an enjoyable learning experience, **not** a competition. Anyone regularly participating in tutorials can expect a reasonable grade for the tutorial work.

IMPORTANT: Do **NOT** divide up the problems between you to work on separately. Groups doing this will be marked in a tougher fashion. You and your group should work **together** on all problems, sharing insights and difficulties as you progress.

Your TA is here to help you – don't be shy to ask questions. If I'm around, do the same with me!

1. Determine the domain of the following function *f*.

$$y = f(x) = \frac{\sqrt[3]{x-1}}{12} - \frac{12}{x^2 - 7x} + \frac{\sqrt{5x+11}}{12}$$

2. Let *f* be a linear function that maps variable *q* (production quantity) to variable *p* (price), such that: $p = f(q) = aq + b$ where *a* represents the slope of the straight line and *b* the *p*–intercept.

Determine the numerical value of parameters *a* and *b*, for the following cases:

a) **Case 1:** It is known that the price of a good is \$2500 per ton (so p = 2500) if the supplied quantity is 1000 tons/week (i.e. q = 1000). It is also known that an increase in price of \$200/ton would prompt suppliers to increase production by 500 tons/week.

b) **Case 2:** The price of another product is \$750/litre if 250 litres/month are sold, whereas if the product were free (i.e. p = 0) then 1750 litres/month would be sold.

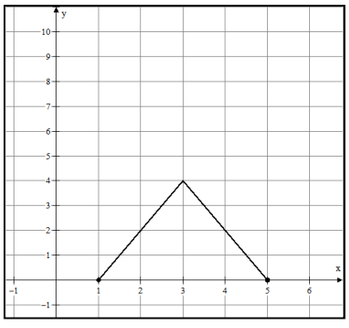
3. Determine the inverse ($\boldsymbol{f}^{-1}$) of the following function ***f***, whose rule is given by:

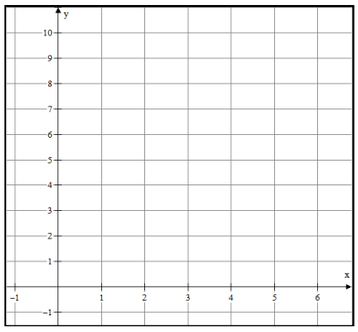
a) $y = f(x) = (3x + 2)$ b) $y = f(x) = x^3 + 8$ c) $y = f(x) = \frac{4 - 5x}{2x + 1}$

4. Consider the graph of the following function $y = f(x)$:

Also let $y = g(x) = 2.5\, f(x)$ and $y = h(x) = f(x) + 3$ and $y = i(x) = -f(x) + 4$

Plot the new curves specified, using the view window on the right:





5. In a supply/demand problem which functions are set equal to one another in order to compute the market equilibrium quantity q_0?

6. Assume the following inverse demand and supply functions: $p^D = -0.05q + 30$ and $p^S = 1/30\, q + 5$.

a) Determine the equilibrium point (q_0, p_0).
b) If a 10% Ad Valorem tax is imposed on the seller, what is the equation (i.e. the rule) of the new inverse supply function p^{S+}?
c) Determine the new equilibrium quantity q_1.
d) Determine the prices p_1 and p_2.
e) Determine the %*BTS* and %*BTB*.
f) Determine the tax revenue.

7. From the graph on the right, determine:

a) The type of tax imposed (Specific or Ad Valorem)
b) Whether the tax is imposed on the seller or the buyer
c) What the value of the tax is (i.e. the price value if the tax is a Specific tax or the rate if the tax is an Ad Valorem tax).