MATH 133 – Calculus with Fundamentals 1
Practice on Combinations of Functions
September 7, 2017

Background

In section 1.3, various ways of combining known functions to produce new ones are discussed. This also leads to some important classes of functions such as polynomial functions, rational functions, algebraic functions and transcendental functions.

Questions

1) (a) Explain how $F(x) = x^6 + 3x^2$ can be thought of as the sum of two other functions. What are those functions?

(b) Explain how $G(x) = x^3\sqrt{x^2 + 1}$ can be thought of as the product of two other functions. What are those functions?

(c) Explain how $H(x) = \dfrac{x^2 + 3}{\sqrt{x^3 + 4}}$ can be thought of as a quotient of two other functions. What are those functions?

2) Describe a real world example where a function (maybe a function of time) we might be interested in is obtained by *adding* two other functions together. Do the same where a function of interest is obtained by *multiplying* two other functions together. (There are many reasonable answers here!)

3) How are the graphs $y = f(x)$, $y = g(x)$ and $y = f(x) + g(x)$ related? Explain using the example $f(x) = x^2$, $g(x) = x$?

(a) Begin by plotting $y = f(x)$ and $y = g(x)$ together on the same set of axes.

(b) Apply the completion of the square technique from earlier in the week to the quadratic function $f(x) + g(x) = x^2 + x$, and use that to plot $y = x^2 + x$ on a separate set of axes from the ones in (a).

(c) Now compare: How is $y = x^2 + x$ getting made from the graphs $y = x^2$ and $y = x$ separately?

4) Give an example of a function in each of the classes of functions from the Background above.