1 Highlights of Calculus: Big Picture

For **Dr. Gil Strang**, calc. is considered a story of relationships between two functions; an example is: function 1 is distance travelled and function 2 (the compliment of function 1) is speed (how fast one is traveling). Another relation is $f_1(x)$ is height and $f_2(x)$ is slope (how quickly one is moving in height). Let's call distance $f(t)$, $y(x)$ for height, speed $f(s)$, etc. etc.; the right letters for these however are: $s = \frac{df}{dt}$ or $\frac{dy}{dx}$.

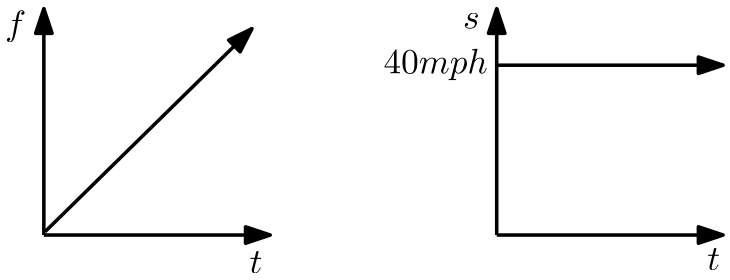

Figure 1: Constant speed

Given that the trip meter of $f(t)$ starts at 0, such that after 1 hour, $t = 40$. When the function $f(t)$ does not result in a constant speed, then the graph of $f(t)$ will be non-linear. The slope therefore, can only be observed as the slope of the tangent line of the instantaneous point of observation. Changing from the overall slope to an instantaneous slope is the essence of differentiation in geometric calculus.

Notice that so far calculus, in this brief introduction, has been a study of relations between two functions (which may be geometrically explained as two curves). For a visualization of this, we provide:

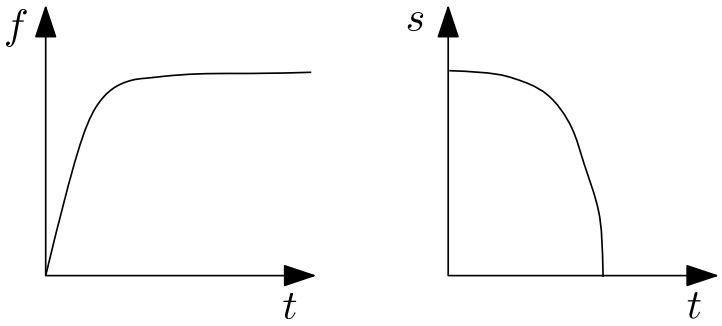

Figure 2: Non linear curves

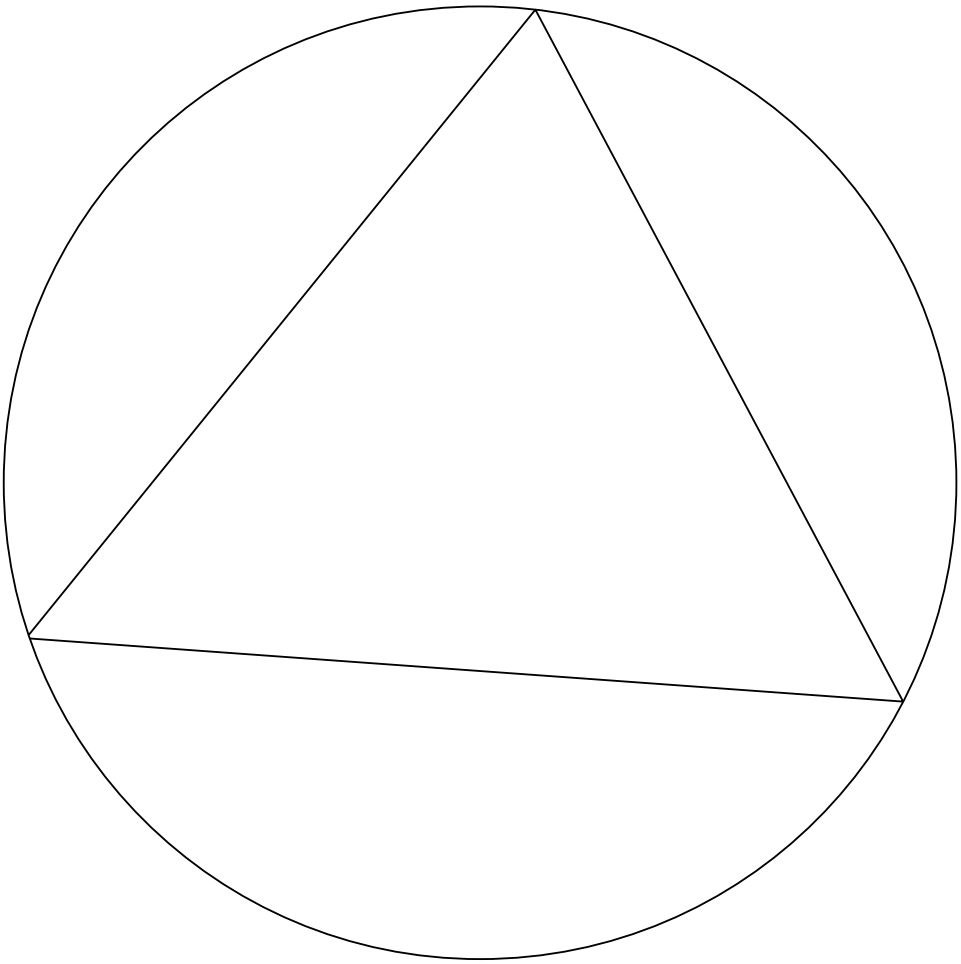

Figure 3: testfig