Worksheet 6, Math 1551, Fall 2017

Sections from Thomas 13^{th} Edition: 3.4, 3.5, 3.6

Exercises

1. A moving object has positive velocity for times $t \in [0, 2)$, negative velocity for $t \in (2, 4]$, and negative acceleration for $t \in [0, 4]$.

   (a) Sketch a graph that could represent the objects' position for $t \in [0, 4]$. Label your axes.

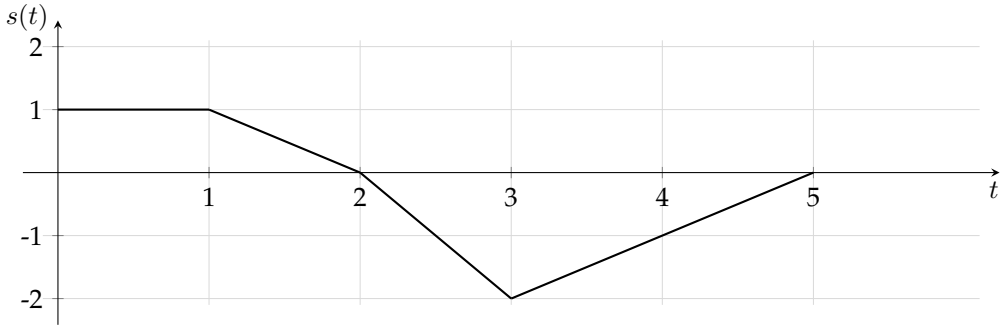
   (b) Give a formula that could represent the objects' position for $t \in [0, 4]$.

2. The graph below gives the position of a moving object, $s(t)$ as a function of time, t.

   (a) Sketch the velocity and the speed of the object on two separate graphs.

   (b) When the speed constant?

   (c) When is the acceleration non-zero?



3. Indicate whether the statement true or false. If it is true, in one or two sentences, explain why. If false, give a counter example or explain why in one or two sentences.

   (a) If $f(x)$ and $g(x)$ are differentiable on the interval (a, b), and $f(x) > g(x)$ over (a, b), then $f'(x) > g'(x)$ on the interval (a, b).

   (b) If $f(x)$ is differentiable for all x, and $f(0) = f'(0) = 0$, then $f(x) = 0$ for all x.

   (c) If the position of a moving object, $s(t)$, is differentiable for $t \in [0, 1]$, and the velocity of the object is positive over $t \in [0, 1]$, then the acceleration must also be positive over $t \in [0, 1]$.

4. Construct an equation of the tangent line to $y(x)$ at $x = 0$.

$$y(x) = \frac{2e^x}{x^2 - 1}$$

5. Differentiate the following functions.

   (a) $y = 1 + f(x^2)g(h(x))$

   (b) $y = \frac{3+9\tan x}{\sec x}$