## HOMEWORK 3

1. Show that the equation $xe^x = 2$ has at least one solution in the interval $[0, 1]$.

2. The position function $s(t) = t^2 - 3t - 4$ represents the position of the back of a car backing out of a driveway and then driving in a straight line, where s is in feet and t is in seconds. In this case, $s(t) = 0$ represents the time at which the back of the car is at the garage door and $s(0) = -4$ is the starting position of the car, 4 feet inside the garage.

   i) Find the time t_0 at which the back of the car is at the garage door.

   ii) Compute $s'(t_0)$. In which unit is it measured?

   iii) Compute the average velocity of the car in the first hour.

   iv) Compute the instantaneous velocity of the car when $t = 100$.

3. Consider the function $f(x) = \sqrt{x + 8}$.

   i) Find the equation of the secant line through the graph of $f(x)$ at the points $x = -4$ and $x = 8$.

   ii) Find the slope of the line r tangent to the graph of $f(x)$ at $x = 0$.

   iii) Write an equation for r.

4. Consider the following graph of the function $f(x)$:
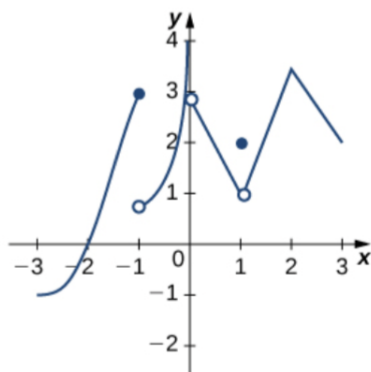
   (i) Find the values of a such that the limit $\lim_{x \to a} f(x)$ does not exist.

   (ii) Determine the values of a such that the limit $\lim_{x \to a} f(x)$ exists but $f(x)$ is not conitnuous at $x = a$.

   (iii) Determine for which values of a, the function is continuous at $x = a$ but not differentiable.

5. Consider the following graph of the function $f(x)$:
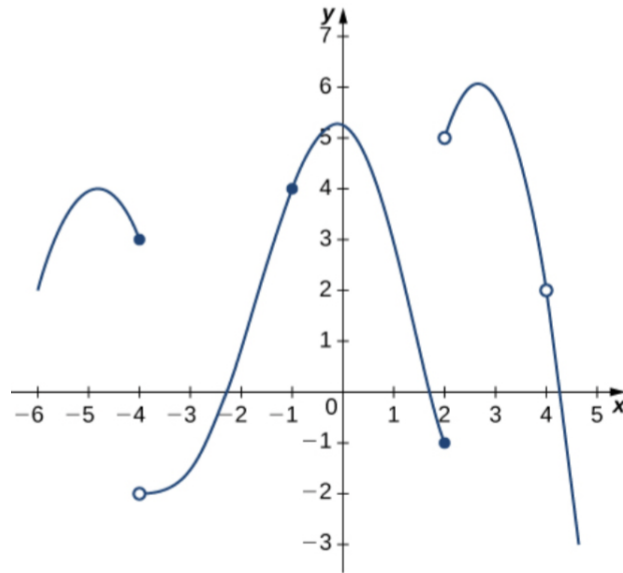
i) Find the values of a such that the function is not continuous at $x = a$.

ii) Find at least one value of x such that $f'(x) = 0$.

iii) Put in increasing order the following vales : $f'(-5)$, $f'(-3.5)$, $f'(-1)$, $f'(1)$, $f'(4.2)$.