Math 100 Sample Test 4– November 2018

Question 1 :

[] Compute

$$\lim_{x \to 0} \frac{1 - e^{ax}}{x}$$

$$\lim_{x \to 0^+} x \ln^2 x.$$

Question 2:

[ ] Sketch the graph of the function $f(x) = x + 9/x$. (Include local extremum, regions where is increasing or decreasing, regions where the curve is concave upward and downward. Label any intercepts, relative extreme, points of inflections and asymptotes).

Question 3 :

[] Find all inflection points on the graph of

$$f(x) = \ln \frac{x-b}{x+b}.$$

Investigate influence of the parameter $b > 0$ on the shape of the graph.

Question 4:

[] A printed page is to have a total area of $80cm^2$ and margins of cm at the top and on each side and of $1,5cm$ at the bottom. What should the dimensions of the page be so that the printed area will be a maximum?

Question 5 :

[ ] Graph one continuous function that satisfies all conditions: $f(0) = 0,\ f''(x) < 0$ for $x < 2$, $\lim_{x\to\infty} f(x) = 0$, $\lim_{x\to 0^-} f'(x) = -\infty, and\ \ \lim_{x\to 0^+} f'(x) = \infty$.

Question 6 :

[] Compute

$$\lim_{x\to\infty} \frac{e^{-ax}}{x^2}$$

$$\lim_{x\to-\infty} \frac{1+\ln(1-x)}{x}.$$