Midterm exam Calculus I–Semester 20201

Time: 60 minutes

Note: ***- Students are not allowed to use books and other materials during the exam***

Question 1 (1 point). Find the domain and the inverse of $y = \frac{x-3}{3x-1}$

Question 2 (2 point). Are the following functions odd or even:

a, $y = cos(x) + sin(x)$. b, $y = \sqrt{2-x} + \sqrt{2+x}$

Question 3 (2đ). Find the limits:

a, $\lim\limits_{x\to 0} \frac{\sqrt[3]{x+1}-1}{e^{3x}-1}$ b) $\lim\limits_{x\to 0} \frac{\sqrt[3]{1+x^3}-1}{\sin x}$.

Question 4 (1 point). Find a and b such that the function $y = a^{2020} \sin|x| + b\cos x$ is continuous at $x = 0$.

Question 5 (1 point). Let $y = x^2 \ln(1+x)$. Find $y^{(11)}(0)$.

Question 6 (1 point). Show that $x - \frac{x^3}{6} < \sin x, \forall x > 0$.

Question 7 (1 point). Find $I = \int \ln(x^2+2)dx$.

Question 8 (1 point). Prove that if $\lim\limits_{x\to 0} f(x) = 0$ and $\lim\limits_{x\to 0} \frac{f(2x)-f(x)}{x} = 0$, then $\lim\limits_{x\to 0} \frac{f(x)}{x} = 0$.