NANYANG TECHNOLOGICAL UNIVERSITY

SPMS/DIVISION OF MATHEMATICAL SCIENCES

2021/22 Semester 1 MH1100 Calculus I Homework 2

Due before 6:00 pm, 04 November, 2021

(3 POINTS) Problem 1 Calculate the limit
(a)

$$\lim_{x\to\infty}(\sqrt{x^2+ax}-\sqrt{x^2+bx});$$

(b)

$$\lim_{x\to\infty}\frac{x^2+6x+5}{2x^3+x-7}.$$

(2 POINTS) Problem 2 Find the limit

$$\lim_{x\to 0}\frac{2x^6+3x^7}{\sin(x)\cdot\sin(x^2)\cdot\sin(x^3)}.$$

(2 POINTS) Problem 3 Use a linear approximation to estimate the given number

$$\sin(92^\circ).$$

(2 POINTS) Problem 4 Find second derivative y'' by implicit differentiation for function $\sin y + xy = x^2$.

(2 POINTS) Problem 5 If $f(1) = 10$ and $f'(x) \leq 1$ for $1 \leq x \leq 2$, how large can $f(2)$ possibly be?

(2 POINTS) Problem 6 If $dx/dt = 5$ and $dy/dt = 4$, and

$$x^3 + y^3 + z^3 = 3$$

find dz/dt when $(x, y, z) = (1, 1, 1)$.

(2 POINT) Problem 7 Evaluate the limit

$$\lim_{\theta\to\pi/3}\frac{\cos\theta-0.5}{\theta-\pi/3}.$$

(Hint: Definition of derivative)