2020/21 Semester 1   MH1100 Calculus I   Homework 2, Nov 06, 2020

Due before 5:00 pm, 06 November, 2020

(4 POINTS) Problem 1 Calculate the limit

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

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

(4 POINTS) Problem 2 Find the limit
$$\lim_{x\to 0} \frac{2x^6 + 3x^7}{\sin(x) \cdot \sin(x^2) \cdot \sin(x^3)}.$$

(4 POINTS) Problem 3 Use a linear approximation to estimate the given number
$$\sin(92°).$$

(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 $f'(x) \le 1$ for $1 \le x \le 2$, 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)