2019/10/21, Calculus Quiz (2), §2.6 ～ §3.2

滿分為 100 分，整體批改標準：說明不清楚都是扣 3 分，符號標錯扣 2 分，其他批改標準於各小題解答後#處。

1.

(10%)(a)

$$-\frac{1}{3\theta} \le \frac{\cos\theta}{3\theta} \le \frac{1}{3\theta} \Rightarrow \lim_{\theta \to -\infty} \frac{\cos\theta}{3\theta} = 0 \text{ by the Sandwich Theorem}$$

(10%)(b)

$$\lim_{r\to\infty} \frac{r + cos\frac{1}{r}}{2r + 7 - 5sinr} = \lim_{r\to\infty} \frac{1 + (cos\frac{1}{r})\frac{1}{r}}{2 + \frac{7}{r} - 5(\frac{sinr}{r})} = \lim_{r\to\infty} \frac{1+0}{2+0-0} = \frac{1}{2}$$

1.只寫答案沒有過程扣 5 分

2.

(20%)(a)

Since the highest power of x in the numerator is 1 more than the highest power of x in the denominator, there is an oblique asymptote. $y = \frac{2x^{3/2}+2x-3}{\sqrt{x}+1} = 2x - \frac{3}{\sqrt{x}+1}$, thus the oblique asymptote is $y = 2x$.

(20%)(b)

$y = \sqrt{\frac{x^2+9}{9x^2+1}}$: $\lim_{x\to\infty} \sqrt{\frac{x^2+9}{9x^2+1}} = \lim_{x\to\infty} \sqrt{\frac{1+\frac{9}{x^2}}{9+\frac{1}{x^2}}} = \sqrt{\frac{1+0}{9+0}} = \frac{1}{3}$ and $\lim_{x\to-\infty} \sqrt{\frac{x^2+9}{9x^2+1}} = \lim_{x\to-\infty} \sqrt{\frac{1+\frac{9}{x^2}}{9+\frac{1}{x^2}}} = \sqrt{\frac{1+0}{9+0}} = \frac{1}{3}$, thus $y = \frac{1}{3}$ is a horizontal asymptote.

3.

(10%)(a)

Definition: Derivative Function

The derivative of the function $f(x)$ with respect to the variable x is the function f' whose value at x is

$$f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

provided the limit exists.

(10%)(b)

$f'(x)$續(a)

If f' exist at a particular x, we say that f is differentiable (has a derivative) at x.

4.(20%)

Slope at origin $= \lim_{h \to 0} \frac{f(0+h)-f(0)}{h} = \lim_{h \to 0} \frac{h^2 \sin\left(\frac{1}{h}\right)}{h} = \lim_{h \to 0} h \sin\left(\frac{1}{h}\right) = 0 \Rightarrow$ yes, f(x) does have a tangent at the origin with slope 0.

=>Yes, f(x) does have a tangent at the origin with slope 0.

2.沒有用導數定義計算扣 10 分