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Faculty of Technology and Environment

Prince of Songkla University Phuket Campus

Exam 1 Semester 2/64

Date 17 February 2022

Course code 976-120 and 977-120

Time 09:00 – 11:00 am

Course Title Mathematics

Lecturer Dr. Pariyaporn Roop-o

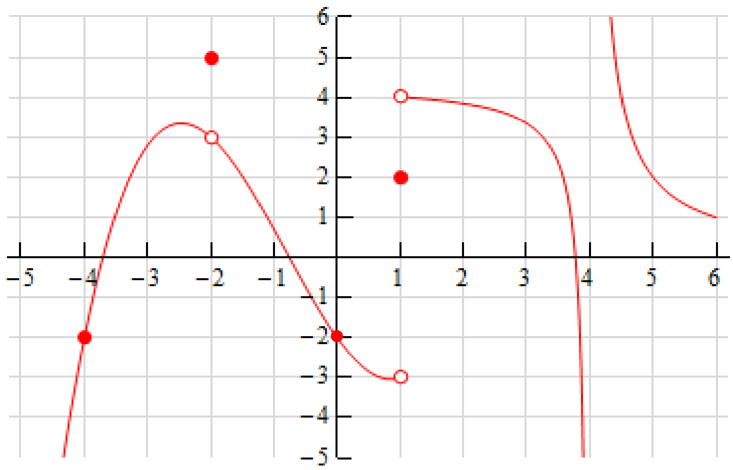
Student Name......นางสาว อัญชลี ปิยรัตน์.......................... Student ID ......6130613056..........

Instructions:

1. This exam consists of **4 printed pages** (include cover and formula of derivatives).
2. The maximum score of this exam is 44 which is **20%** of this course.
3. Absolutely no books are allowed during the examination **except the handouts of this course**.
4. **Be sure to show all the steps necessary for the calculation. Correct answers without necessary work will receive only minimal point.**
5. **Submit as pdf or picture files and please name all files as student ID**.

No.	Full score	Student's scores
1	16	
2	4	
3	4	
4	5	
5	4	
6	6	
7	5	
Total	44	

1. Use the given graph of f to state the value of each quantity, if it exists. (16 scores)



1) $\lim_{x\to -2^-} f(x) =$ 3
2) $\lim_{x\to -2^+} f(x) =$ 3
3) $\lim_{x\to -2} f(x) =$ 3
4) $f(-2) =$ 5
5) $\lim_{x\to 0} f(x) =$ -2
6) $f(0) =$ -2
7) $\lim_{x\to 4^-} f(x) =$ หาค่าไม่ได้
8) $\lim_{x\to 4^+} f(x) =$ หาค่าไม่ได้
9) $\lim_{x\to 4} f(x) =$ หาค่าไม่ได้
10) Domain of f is ....

11) Range of f is ....

12) The equation of the vertical asymptote is..........

13) Is f continuous at $x=-2$? Why?

....

2. Find the domain of $f(x)=\dfrac{\sqrt{16-x^2}}{x-1}$. (4 scores)

3. Suppose $\lim\limits_{x\to 4} f(x)=3$ and $\lim\limits_{x\to 4} g(x)=6$. Determine the following limits: (4 scores)

(a) $\lim\limits_{x\to 4}\left[f(x)+2g(x)\right]=$ $\lim\limits_{x\to 4} f(x)+\lim\limits_{x\to 4} 2g(x) = 3+2(6) = 15$

(b) $\lim\limits_{x\to 4} 2\left[f(x)g(x)\right]=$ $2\cdot\lim\limits_{x\to 4} f(x)\cdot\lim\limits_{x\to 4} g(x) = 2(3)(6) = 36$

(c) $\lim\limits_{x\to 4}\left[\dfrac{3f(x)-g(x)}{f(x)+g(x)}\right]=$ $\dfrac{3(3)-6}{3+6} = \dfrac{3}{9} = \dfrac{1}{3}$

(d) $\lim\limits_{x\to 4}\sqrt{f(x)+3g(x)}=$ $\sqrt{\lim\limits_{x\to 4} f(x)+\lim\limits_{x\to 4} 3g(x)} = \sqrt{3+3(6)} = \sqrt{21}$

4. Evaluate $\lim\limits_{x\to 0}\dfrac{\sin(5x)}{x^2+3x}$. (Do not use L'Hopital's rule) (5 scores)

$$\lim_{x\to 0}\frac{\sin(5x)}{x^2+3x} = \frac{1}{\lim\limits_{x\to 0}\dfrac{x^2+3x}{\sin 5x}}$$

$$= \frac{1}{\lim\limits_{x\to 0}\dfrac{x^2}{\sin 5x}+3\lim\limits_{x\to 0}\dfrac{x}{\sin 5x}}$$

$$= \frac{1}{\dfrac{1}{\lim\limits_{x\to 0}\dfrac{\sin 5x}{x^2}}+\dfrac{3}{\lim\limits_{x\to 0}\dfrac{\sin 5x}{x}}}$$

$$= \frac{1}{\dfrac{5}{\lim\limits_{x\to 0}\dfrac{1}{x}\cdot\lim\limits_{x\to 0}\dfrac{\sin 5x}{5}}+\dfrac{15}{\lim\limits_{x\to 0}\dfrac{\sin 5x}{5x}}}$$

$$= \frac{1}{\dfrac{5}{\infty}+15}$$

$$= \frac{1}{0+15}$$

$$= \frac{1}{15}$$

5. Evaluate $\lim\limits_{x\to -\infty}\dfrac{2x^3-5x+9}{x^2-4x-1}$. (4 scores)

$$= \lim_{x\to-\infty}\frac{x^3\left(2-\frac{5}{x^2}+\frac{9}{x^3}\right)}{x^3\left(\frac{1}{x}-\frac{4}{x^2}-\frac{1}{x^3}\right)}$$

$$= \lim_{x\to-\infty}\frac{\left(2-\frac{5}{x^2}+\frac{9}{x^3}\right)}{\left(\frac{1}{x}-\frac{4}{x^2}-\frac{1}{x^3}\right)}$$

$$= -\infty$$

6. Evaluate $\lim\limits_{x\to\infty}\left(x-\sqrt{x^2+2x}\right)$. (Do not use L'Hopital's rule) (6 scores)

$$= \lim_{x\to\infty} x-\sqrt{x^2+2x} \cdot \frac{x+\sqrt{x^2+2}}{x+\sqrt{x^2+2}}$$

$$= \lim_{x\to\infty} \frac{x^2-(x^2+2x)}{x+\sqrt{x^2+2x}}$$

$$= \lim_{x\to\infty} \frac{-2x}{x+\sqrt{x^2+2}}$$

$$= \lim_{x\to\infty} \frac{-2}{1+\sqrt{1+\frac{2}{x^2}}}$$

$$= \frac{-2}{1+\sqrt{1+0}}$$

$$= \frac{-2}{1+1}$$

$$= \frac{-2}{2}$$

$$= -1$$

7. For what value of the constant k is the function $f(x)=\begin{cases}\dfrac{x^2-5x+6}{x-2} & ;x\neq 2\\ kx-3 & ;x=2\end{cases}$

continuous on $(-\infty,\infty)$ (5 scores)