

榮譽第一

國立東華大學
應用數學系

學年度第 學期

考試科目：

期中 期末考試試卷

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班別

任課教師：

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1. $f(x) \begin{cases} 1 & x > 0 \\ -1 & x \leq 0 \end{cases}$ the domain of the function is $x \neq 0 \Rightarrow (-\infty, 0) \cup (0, \infty)$
 $\frac{x}{x} = 1$ the range of the function is $f(x) = 1$ or -1

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2. $f(x) \begin{cases} x+3 & x > 3 \\ -x-3 & x \leq 3 \end{cases}$ the $f(x) = |x+3|$ is not one-to-one.

horizontal test

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3. $f(x) = \frac{x+4}{3(x^2-4)} = \frac{x+4}{3(x+2)(x-2)}$ when $x \neq 2, -2$ the function is continuous
 discontinuities $x = 2, -2$ they are not removable it cannot transfer to another function.

$\lim_{x \rightarrow 2} \frac{x+4}{3(x-2)(x+2)}$ DNE $\lim_{x \rightarrow -2} \frac{x+4}{3(x+2)(x-2)}$ DNE

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4. $\lim_{x \rightarrow -3} \frac{-x-3}{x+3} = -1$ (b) $\lim_{x \rightarrow -2^+} \frac{3}{(x+1)(x-2)} = -\infty$ as it approach from the right side (c) $\lim_{x \rightarrow 4} \frac{\sqrt{x+5}-3}{x-4} \cdot \frac{\sqrt{x+5}+3}{\sqrt{x+5}+3}$

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5. $f(x) = \frac{18x^2+3x-10}{2x-3}$ $f'(x) = \frac{(36x+3)(2x-3) - (18x^2+3x-10) \cdot 2}{(2x-3)^2}$

$f'(1) = \frac{(-3)(-5) - 5 \cdot 2}{25}$

$= \frac{15-10}{25} = \frac{5}{25} = \frac{1}{5}$

$y+1 = \frac{1}{5}(x+1)$

$y = \frac{1}{5}x + \frac{4}{5}$

(b) $x^2y^2 + y^4 = 2x^2$

$\frac{d}{dx}(x^2y^2 + y^4) = \frac{d}{dx}(2x^2)$

$2x \cdot y^2 + x^2 \cdot 2y \cdot \frac{dy}{dx} + 4y^3 \cdot \frac{dy}{dx} = 4x$

$\frac{dy}{dx}(2x^2y + 4y^3) = 4x - 2xy^2$

$\frac{dy}{dx} = \frac{4x - 2xy^2}{2x^2y + 4y^3}$ $y=1 = \frac{1}{3}(x-1)$

(1,1) $m = \frac{4-2}{2+4} = \frac{2}{6} = \frac{1}{3}$ $y = \frac{1}{3}x + \frac{2}{3}$

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6. $f'(x) = 3(x^3-2x)^2 \cdot (3x^2-2)$

$f''(x) = 3[2(x^3-2x) \cdot (3x^2-2) \cdot (3x-2) + (x^3-2x)^2 \cdot (6x)]$

$f''(1) = 3[2 \cdot (1-2) \cdot (3-2) \cdot (3-2) + (1-2)^2 \cdot (6)]$

$= 4 \cdot 3 = 12$

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7. $f(x) = \frac{\sqrt{2x-1} + x \cdot \frac{1}{2}(2x-1)^{-\frac{1}{2}}}{(\sqrt{2x-1})^2} = \frac{\sqrt{2x-1} + x \cdot (2x-1)^{-\frac{1}{2}}}{\sqrt{2x-1}}$

$\sqrt{2x-1} + x \cdot (2x-1)^{-\frac{1}{2}} = 0$

$2x-1-x=0$

$x-1=0$

$x=1$ the point is (1,1)

$y=1$

