

The University of Jordan Mothematics Department Calculus I Second Exam 19/8/2017 اسم الطلب: محمد الينسو رمزي الرسلون المالية: بد منال عاض

الرقم الجامعين

التلصص: عديدة

Part (1): In questions 1 - 10, fill in the blank to get correct sentence.

(2 marks each)

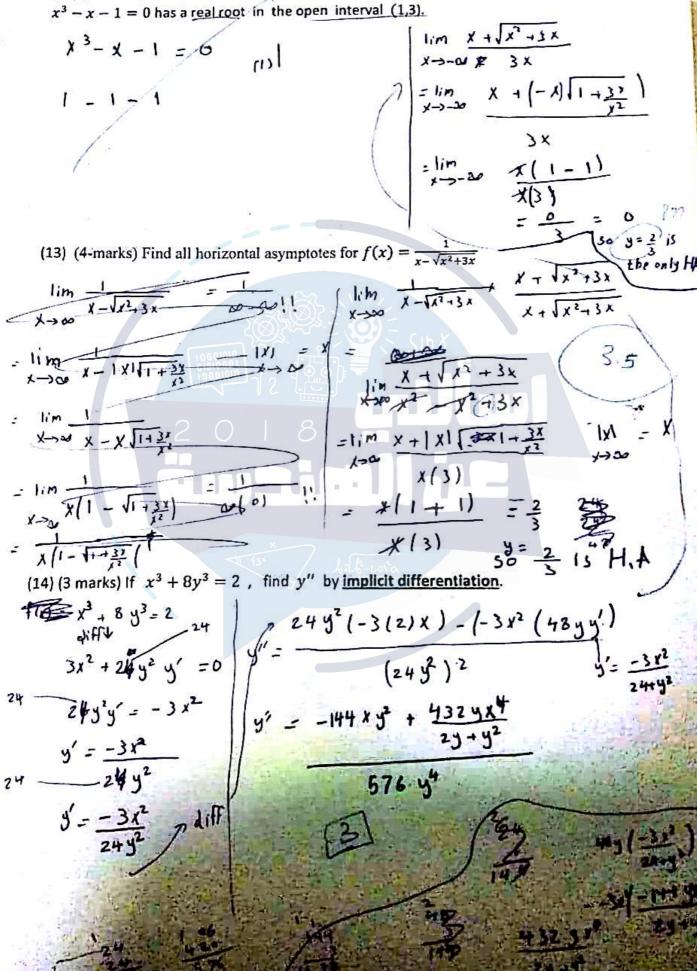
- (1) The function $f(x) = \frac{x+3}{x^2-9}$ has removable discontinuity at x = ... -3...
- (3) $\frac{d}{dx}(\cos(\tan^{-1}(1+10x)) = -\sin(\tan^{-1}(1+10x))(\frac{1}{1+(1+10x)^2})(10)$
- $(4) \frac{d}{dx}(x^{4x}) = -\frac{1}{X} \frac{4x}{x} \left(-\frac{1}{4} \frac{1}{X} + \frac{1}{4} \ln x \right),$
- (5) If $g(x) = \frac{\sqrt{\tan x + 10 \, e^2}}{(\sec^2 x) \, (4x + 1)^2}$, then by using logarithmic differentiation $g'(x) = \dots$
- (6) The function $f(x) = \begin{cases} mx + b & \text{if } x < 4 \\ x^2 & \text{if } x \ge 4 \end{cases}$ is differentiable at 4

when m = ...6, and b = ...16

- (7) If $f(x) = x^{11} + 6x + 4$, then $(f^{-1})'(4) = \frac{1}{6}$
- (8) By using linear approximation, $\sqrt{80} \approx 3 \frac{1}{4(27)}$
- (9) Equation of the tangent line to the curve of $y = x^4 + 4^x$ at the point (1,5) is (y = 5) = 44
- $(10) \lim_{x\to\infty} \frac{e^{-x}-4e^x}{2e^{-x}+3e^x} = \dots$
 - (11) $\lim_{x \to -4} \frac{\sin(x^2 + 5x + 4)}{x + 4} = -3$

Part (II): In questions 12-14, give your answer in details

(12) (3- marks) Using the intermediate value theorem, show that the equation $x^3 - x - 1 = 0$ has a real root in the open interval (1,3).





Jordan University Mathematics Department Calculus I, Second Exam, 5/7/2017

Student's Name: _

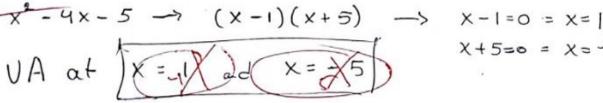
Student Number: ___

Lecture Time: 12:30 - 2:00

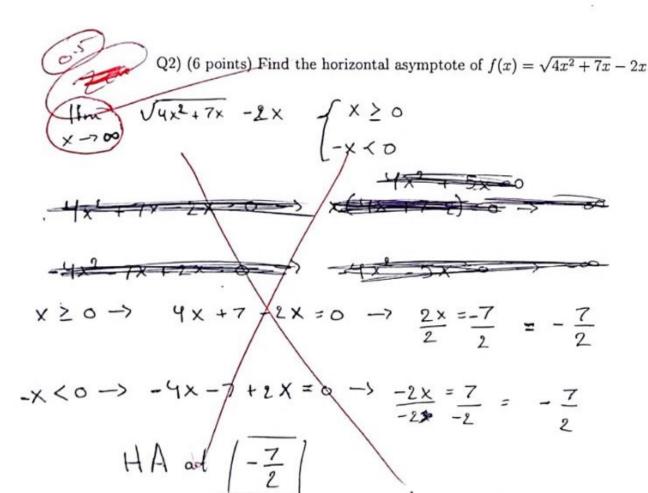
#41

Remark: Show your supporting work. Final answers without supporting work receives no credit.

Q1) (3 points) Find the vertical asymptote of $f(x) = \frac{x^2 + 2x + 1}{x^2 - 4x - 5}$.



X+5=0 = X=-5



1 x -1-5 x 2 x 5

Q3) Find the following limits (Do not use L'Hospital's rule):

(a) (2 points)
$$\lim_{x \to -5} \frac{x^2 - |x| - 20}{x + 5}$$
 (x - 4) (x + 5)

b) (3 points)
$$\lim_{x \to \infty} \frac{\sin^2(7x)}{x^2}$$

(et $u = x^2$ $x = \sqrt{u}$

$$\lim_{u \to \infty} \frac{\sin^2(7x)}{x^2}$$

$$\frac{7 \cos^2(7x)}{2x}$$

$$F(x) - F(a) = \begin{cases} c \\ c \end{cases} (2 \text{ points}) \lim_{x \to 0} \frac{5^{x} - 1}{x} - \begin{cases} 5^{x} - 1 \\ x - 0 \end{cases}$$

(1) (4 points) If $e^y + 4xy = e$, then find equation of the tangent line at the point



Q5) Find the derivative of the following functions:

a) (2 points)
$$f(x) = \tan^{-1}(x^4)$$

$$\int (x) = \sqrt{1 - (X^4)^2} = \sqrt{1 + (X^4)^2}$$

b) (2 points)
$$f(x) = 7^{(\frac{9}{x})}$$

$$F'(x) = 7^{(\frac{9}{x})} \cdot -\frac{q}{x^2} \cdot \frac{1}{x^2}$$

$$\frac{q}{x} = \frac{0'v - v'v}{v^2} \cdot \frac{-q}{x^2}$$

c) (2 points)
$$f(x) = \log_6(x^3 + 5x + 1)$$

$$f'(x) = \frac{3 x^2 + 5}{(x^3 + 5x + 1)(1-6)}$$

d) (4 points)
$$f(x) = (7x+1)^{\cos^3(3x)}$$

$$F'(x) = (7x+1)^{\cos^3(3x)} - 3\sin^3(3x) \cdot |u(7x+1)|$$

$$\frac{d}{dx} = \cos^3(3x) = -3\sin^3(3x)$$



رقع تسلملي 15

د. فواس يوسف The University of Jordan

DEPARTMENT OF MATHEMATICS



Calculus I

EXAM 2B / 1st SEMESTER 2016-2017

Date: 03/12/2016

^ ...) وقت المعاضرة: (00: 21 - 00 : 1 ...)

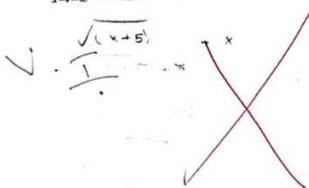
Instructions: The test one two-sided page; make sure you do both sides. You CANNOT use a calculator on any part of this exam. The point value of each problem is indicated in brackets. Finally, before you start to work a problem, be sure that you understand what is being asked.

For questions 1 to 12, fill in the blank with the correct answer. Only correct answers count. [1.5 pts each]

- 2. $\lim_{h\to 0} \frac{6(1+h)^6-6}{h} = \frac{\pm}{26}$
- 4. $\frac{d}{dx} \left[\log_5 \left(x^2 + \pi^2 \right) \right] = \dots$
- 5. $f(x) = \frac{\sin(x)}{\sqrt{9 x^2}}$ is continuous on $(-\infty) = \frac{\sin(x)}{\sqrt{9 x^2}}$
- 7. If g(0) = 3, g'(0) = 2 and $f(x) = \frac{5 2e^{3x}}{x + g(x)}$, then $f'(0) = \frac{1}{x + g(x)}$
- 8. $\lim_{x \to 0} \frac{1 \cos^2(7x)}{x^2} = \lim_{x \to 0} \frac{\sin^2(7x)}{x^2} = \frac$
- 9. If $f(x) = \sec^3(4^x)$, then $f'(x) = \dots$
- 10. If $f(x) = \ln(x+5)$, then $\lim_{x\to 2} \frac{f(x)-f(2)}{x-2} = \dots$
- 11. The vertical asymptote of $f(x) = \frac{x-3}{x^2-5x+6}$ is $t = \frac{2}{x^2-5x+6}$
- 12. $\lim_{x \to -1} \frac{2x+2}{|x|+1} = \dots$ $\lim_{x \to -1} \frac{2x+2}{|x|+1} = \frac{2(-1)+2}{x} = \frac{3}{x} = 0$.

For question 13, 14, and 15, sufficient work must be shown to receive credit.

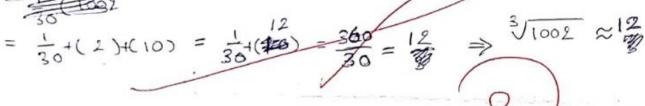
13. [4 pts] Find $\lim_{x \to -\infty} \sqrt{x^2 + 5x} + x$.



14. [4 pts] Use the linear approximation to estimate ³√1002.

$$y = F(a) + (x - a) \cdot F(a) = \frac{1}{30} \cdot (1002 - 1006) \cdot (10)$$

$$= \frac{1}{30} + (2) + (10) = \frac{1}{30} + (\frac{12}{30})$$



15. [4 pts] Differentiate $f(x) = \frac{\sqrt[4]{x} \sin^6(x)}{(x-1)^{8/6}}$.

$$F'(x) = \frac{1}{4\sqrt[4]{x}} \frac{1}{6\cos^5(x)} = \frac{1}{8(x-1)^7} \frac{1}{e^2x}$$

الرقم الجامعي: ١١٥١٥١٥ الرقم

التقمس: مينية

Part (I): In questions 1 - 10, fill in the blank to get correct sentence.

(2 marks each)

- (1) The function $f(x) = \frac{x+3}{x^2-9}$ has removable discontinuity at x = -3
- (2) The function $f(x) = \frac{x+10}{(x-3)\cos x}$ $x \in [0,2\pi]$ has vertical asymptote(s) at x = ...3...x. $X = (2n+1) \angle x$
- (3) $\frac{d}{dx}(\cos(\tan^{-1}(1+10x)) = -\sin(\tan^{-1}(1+10x))(\frac{1}{1+(1+10x)^2})(10)$
- $(4) \frac{d}{dx}(x^{4x}) = \times \frac{4x}{x} \left(\frac{Hx}{x} + \frac{4\ln x}{x} \right)$
- (5) If $g(x) = \frac{\sqrt{\tan x + 10 e^x}}{(\sec^2 x) (4x+1)^{\frac{x}{3}}}$, then by using logarithmic differentiation $g'(x) = \dots$
- (6) The function $f(x) = \begin{cases} mx + b & \text{if } x < 4 \\ x^2 & \text{if } x \ge 4 \end{cases}$ is differentiable at 4

when m = .8, and b = -16

- (7) If $f(x) = x^{11} + 6x + 4$, then $(f^{-1})'(4) = \frac{1}{6}$
- (8) By using linear approximation, $\sqrt{80} \approx 3 \frac{1}{4(27)}$ $\sqrt{3} \frac{1}{168}$
- (9) Equation of the tangent line to the curve of $y = x^4 + 4^x$ at the point (1,5) is (y 5) = H + H + (x 1)
- (10) $\lim_{x\to\infty} \frac{e^{-x}-4e^x}{2e^{-x}+3e^x} = \dots$

(11)
$$\lim_{x \to -4} \frac{\sin(x^2 + 5x + 4)}{x + 4} = -3$$

Part (II): In questions 12-14, give your answer in details

(12) (3- marks) Using the intermediate value theorem, show that the equation $x^3 - x - 1 = 0$ has a real root in the open interval (1,3).

(13) (4-marks) Find all horizontal asymptotes for
$$f(x) = \frac{1}{x - \sqrt{x^2 + 1}x}$$

lim
$$\frac{1}{1-\sqrt{2}+3x}$$
 = $\frac{1}{20-3}$!! $\frac{1}{20}$

lim $\frac{1}{1-\sqrt{2}+3x}$ = $\frac{1}{20-3}$!! $\frac{1}{20}$

lim $\frac{1}{1-\sqrt{2}+3x}$ = $\frac{1}{20}$

lim $\frac{1}{1-\sqrt{2}+3x}$ = $\frac{1}{20}$

$$=\lim_{x\to\infty}\frac{x+\sqrt{x^2+3x}}{x^2-y^2-3x}$$

$$=\lim_{x\to\infty}\frac{x+|x|}{x(3)}$$

$$\frac{x(3)}{x(3)} = \frac{3}{3} \frac{3}{3}$$
y implicit differentiation.

(14) (3 marks) If
$$x^3 + 8y^3 = 2$$
, find y" by implicit differentiation.

$$710 = \frac{1}{3} \frac{1}{3$$



The University of Jordan

DEPARTMENT OF MATHEMATICS

EXAM 2B / 1st SEMESTER 2016-2017

الاسم: .. بنورهم مرجم محصود المحل و الرقم الجامعي: (....

Instructions: The test one two-sided page; make sure you do both sides. You CANNOT use a calculator on any part of this exam. The point value of each problem is indicated in brackets. Finally, before you start to work a problem, be sure that you understand what is being asked.

For questions 1 to 12, fill in the blank with the correct answer. Only correct answers count. [1.5 pts each]

- 2. $\lim_{h \to 0} \frac{6(1+h)^6-6}{h} = 3.6$
- 3. The equation of the tangent line to the graph of $y = \sin^{-1}\left(\frac{x}{3}\right)$ at the origin
- 4. $\frac{d}{dx} \left[\log_5 \left(x^2 + \pi^2 \right) \right] = \frac{2 \times 3}{\sqrt{9 x^2}}$ is continuous on $\left(-\frac{3}{3}, \frac{3}{3}, \frac{3}{3} \right)$
- 6. $\lim_{x \to \frac{\pi}{2}} e^{\sec(x)} = \dots$
- 7. If g(0)=3, g'(0)=2 and $f(x)=\frac{5-2e^{3x}}{x+g(x)}$, then $f'(0)=\frac{3}{x+g(x)}$
- 8. $\lim_{x \to 0} \frac{1 \cos^2(7x)}{x^2} = \frac{49}{x^2}$
- 9. If $f(x) = \sec^3(4^x)$, then $f'(x) = \frac{12 \sec^3(4x) + \tan(4x)}{2 \sec^3(4x)}$
- 10. If $f(x) = \ln(x+5)$, then $\lim_{x \to 2} \frac{f(x) f(2)}{x-2} = \frac{1}{x-2}$
- 11. The vertical asymptote of $f(x) = \frac{x-3}{x^2-5x+6}$ is $x = \frac{2}{x^2-5x+6}$
- 12. $\lim_{x \to -1} \frac{2x+2}{|x|+1} = -2x$

For question 13, 14, and 15, sufficient work must be shown to receive credit. 13. [4 pts] Find $\lim_{x \to -\infty} \sqrt{x^2 + 5x} + x$. = $\infty - \infty$ [!] $\lim_{x \to -\infty} \sqrt{x^2 + 5x} + x \cdot \sqrt{x^2 + 5x} - x$ $\lim_{x \to -\infty} \sqrt{x^2 + 5x} - x$ $\lim_{x \to -\infty} \sqrt{x^2 + 5x} - x$ $\lim_{x \to -\infty} \frac{5x}{\sqrt{x^2(1+\frac{5}{x})}-x} \to \lim_{x \to -\infty} \frac{5x}{|x|\sqrt{1+\frac{5}{x}}-x}$ $\frac{5}{x^{2}-x^{2}}\frac{5}{x(-\sqrt{1+5x}-1)}=\frac{5}{-\sqrt{1+0}-1}=-\frac{5}{2}$ 14. [4 pts] Use the linear approximation to estimate $\sqrt[3]{1002}$. E(b) = f(a) + f(a). (b-a) P= 1005 a = 1000 $E(x) = \sqrt{\frac{x}{1}} = x^{\frac{3}{2}}$ $3\sqrt{1005} \approx 10 + \frac{300}{300} (1002 - 1000)$ $e(x) = \frac{3}{1} \times \frac{3}{3}$ e(\$000) = 3/1000 = 10 $E(1000) = \frac{3(1000)^{5}}{1} = \frac{300}{1}$ E(1000) = 1000 = 1015. [4 pts] Differentiate $f(x) = \frac{\sqrt[4]{x} \sin^{6}(x)}{(x-1)^{8} e^{x^{2}}}$. $y = \frac{4(x-1)^{6}e^{x}}{(x-1)^{8}e^{x^{2}}}$ $Lny = Ln (x-1)^{8}e^{x^{2}}$ $Lny = Ln (x-1)^{8}e^{x^{2}}$ $Lny = Ln (x-1)^{8}e^{x^{2}}$ $Lny = Ln (x-1)^{8}e^{x^{2}}$ $\frac{y'}{y} = \frac{\frac{1}{4}x^{\frac{7}{4}}}{x^{\frac{1}{4}}} + \frac{6\sin(x) \cdot \cos(x)}{\sin^{6}(x)} - \frac{8(x-1)^{\frac{7}{4}}}{(x-1)^{\frac{8}{4}}} - \frac{2x \cdot e^{x}}{e^{x}}$ $y' = \left(\frac{1}{4}x^{-\frac{3}{4}} + 6\frac{\cos(x)}{\sin(x)} - \frac{8}{(x-1)} - 2x\right) \cdot \frac{\sqrt[4]{x \cdot \sin^6(x)}}{(x-1)^8 e^{x^2}}$ Good Luck

Management and the second الجامعه الاردنية قسم الرياضيات ریاضیات ۱،۱ الامتحان الاول ألرقم الجامعي: المدرس: د. الحال د رعاوی 14. - 15: Y. وقت المحاضره: 1- (6pts). Find the following limits (Don't use L'Hospital rule), a) $\lim_{x\to 2^+} \left(\frac{1}{x-2} - \frac{4}{x^2-4} \right)$ c) $\lim_{x\to\infty} (\sqrt{x^2 - 3x - x})$ 29210125000

aca) -N-300 0 600 x-3-00 x(x)-01 OSE DOS 11m d - 9 a - 3 a (-d) - 3

2- (3+4pts). Let
$$f(x) = \begin{cases} \frac{x^2 - x}{x|x| - x} & x \neq \pm 1,0 \\ 2 & x = \pm 1,0 \end{cases}$$

- a) Find and classify the discontinuity of f.
- b) Find the vertical and horizontal asymptotes of f.

20,9

$$(1-1)$$
 $=$ 2
 $(1,-1)$ $=$ 2

$$\frac{1}{2} \left(\frac{1}{2} \right) = \frac{1}{2} \left(\frac{1}{2} \right)$$

3- (4pts). Find the derivative of the following functions.

a)
$$f(x) = \frac{\ln(\sin 2x)}{x-1}$$

b)
$$g(x) = \sin^{-1}(e^{3x})$$

$$f(\alpha) = 2 \frac{\cos \alpha}{\sin \alpha} \cdot (\alpha - 1) - \frac{\ln(\sin 2\alpha)}{\sin \alpha}$$

$$\left(\frac{d}{d} - V \right)^2$$

31-0 0010

الرقم الجامعي:

! Kwa :

اسم المدرس:

وقت المحاضرة:

For instructor use only, please do not write in this table.

01	Q2	Q3	Grade
6-7	5	7	129!

