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الجامعة الأردنية	الامتحان الثاني: تفاضل وتكامل -1	السبت 2013/12/7
اسم الطالب: عمرو محمد الصالحي		مدرس المادة: د. مي كحيل
الرقم الجامعي: ٠١٣٢٠٠٢		وقت المحاضرة: ١٠-١١

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In questions 1 to10, fill in the planks (2 marks each):

[1] The local linear approximation near $a = 0$ for $(1+x)^2$ is $y=$ $(1+x)^2 = 2x + 1$

[2] If $\sinh(x) = -2$, then $tanh(x) =$ $\frac{-2}{\sqrt{5}}$

[3] Equation of the tangent line to the curve of

$xy^4 + x^2y = x + 4y$ at the point (2,1) is $(y-1) = \frac{-1}{2}(x-2) \Rightarrow y = \frac{-1}{2}(x-2)+1$

[4] $\lim_{x\to -2} \frac{\sin(x^2+3x+2)}{x+2} =$ -1

[5] $\frac{d}{dx}\left(ln\sqrt{\frac{5x+1}{6x-2}}\right) = \frac{1}{2}\left(\frac{5}{5x+1} - \frac{6}{6x-2}\right)$

[6] $\frac{d}{dx}(sech^3(sinh^{-1}(x))) = 3\, sech^2(sinh^{-1}(x)) \times -sech(sinh^{-1}(x)) \times tanh(sinh^{-1}(x)) \times \frac{1}{\sqrt{x^2+1}}$

[7] $\frac{d}{dx}(x^{2x}) = x^{2x}(2 + 2\ln x)$

[8] The function $f(x) = \frac{x^3-64}{x^2-16}$

has removable discontinuity at $x =$ 4

[9] $\frac{d}{dx}(tan^{-1}(2^x)) = \frac{1}{1+(2^x)^2} \times 2^x \times \ln 2$

[10] If $\frac{d}{dx}(f(x^2)) = x^2$, then $f'(x^2) =$ $\frac{x}{2}$

$f'(x^2) \cdot 2x = x^2$

In questions 11 to13, solve and show your work.

[11] (4 marks) Find all horizontal asymptotes for $\sqrt{x^2+x}-x$.

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

$\lim_{x\to-\infty} \infty - -\infty = \infty$

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

$\frac{x^2+x-\cancel{x^2}}{\sqrt{x^2+x}+x} = \frac{x}{|x|\sqrt{1+\frac{1}{x}}+x}$

$\lim_{x\to\infty} \frac{x}{x\sqrt{1+\frac{1}{x}}+x} = \frac{1}{\sqrt{1+0}+1} = \frac{1}{2}$

$\lim_{x\to-\infty} \frac{\cancel{x}\,1}{-\cancel{x}\sqrt{1+\frac{1}{x}}+\cancel{x}\,1} = \frac{1}{-\sqrt{1+0}+1} = \frac{1}{0}$

$\therefore \Rightarrow y = \frac{1}{2}$ H.A

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[12] (4 marks) Assume that f(x) is differentiable at $x = 2$ and $\lim_{x\to2}\frac{x^3f(x)-24}{x-2} = 28$. Then

$\lim_{x\to2}(x-2)=0$

(a) Find $f(2)$ $\lim_{x\to2} x^3 f(x) - 24 = 0$

$8f(2) - 24 = 0$

$f(2) = \frac{24}{8} = 3$

$f(2) = 3$

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(b) Find $f'(2)$ Lobital

$\lim_{x\to2} \frac{x^3 f'(x) + f(x)\cdot 3x^2}{1} = 28$

$8f'(2) + 3\times3\times4 = 28$

$f'(2) = \frac{28-9\times4}{8} = \frac{7-9}{2} = \frac{-2}{2} = -1$

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[13] (2 marks) Show that the equation $x^3 - x^2 = x + 3$ has a real solution

$f(x) = x^3 - x^2 - x - 3$

Poly. $\Rightarrow$ cont. on $\mathbb{R}$

$f(0) = -3 < 0$

$f(3) = 12 > 0$

$\Rightarrow$ I.V.T

there is $f(x) = 0 \quad x \in (0,3)$

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THE UNIVERSITY OF
JORDAN

0301101 Calculus I | Second test | Nov. 29, 2014

Name: | Number:

Instructor's name: | Class days and time:

Questions 1 to 11: fill in the blanks with the answers only. Each question is worth 2 marks.

___ Q1) The vertical asymptote(s) of $f(x) = \frac{\tan x}{x^3-9x}$ is (are)

___ Q2) $\frac{d^{21}}{dx^{21}}(3^x) =$

___ Q3) If $f(x) = x^4$, then $\lim_{x \to 2} \frac{f(x)-16}{x-2} =$

___ Q4) The function $f(x) = \frac{x-2}{|x|-2}$ has removable discontinuity at the point(s)

___ Q5) $\lim_{x \to 1} \frac{3\sin(x^2-1)}{x-1} =$

___ Q6) If $f(x) = \sin^{-1}(\log_3 x)$, then $f'(x) =$

___ Q7) If $f'(x) = \frac{x}{x^2+1}$, $g(x) = \sqrt{x}$ and $h(x) = f(g(x))$, then $h'(1) =$

___ Q8) Using linear approximation (linearization), the best estimate of 0.99^4 is

___ Q9) The horizontal asymptote(s) of $f(x) = \frac{\sqrt[3]{3x^3+1}}{x-3}$ is (are)

___ Q10) If $f(x) = x^2 - 8x + 21, x \leq 4$, then $(f^{-1})'(14) =$

Questions 11 and 12: Each part is worth 4 marks. Write all solution steps .

____ Q11) Let $y = (\sin 2x)^{3x}$. Find $\frac{dy}{dx}$.

____ Q12) Given the curve $x^2 + 4y^2 = 1$.

a) Find the point(s) on this curve where the tangent line has the slope 1.

b) Find $\frac{d^2y}{dx^2}$.

The University of Jordan | Department of Mathematics

Math 101 Second Exam | Second Semester | 25/4/2015

اسم الطالب: الرقم الجامعي:

اسم المدرس: وقت المحاضرة:

Part I. Write down only the answers of the questions (1-9). Each question is worth 2 points.

1. $\lim\limits_{x\to 0} \dfrac{\sin 3x}{7x^3 - 4x} =$

2. $\lim\limits_{x\to 4} \dfrac{\sqrt{3x+4} - 4}{x-4} =$

3. $\lim\limits_{x\to 1^-} \dfrac{x^2 - 1}{|x-1|} =$

4. The horizontal asymptote(s) of $\dfrac{\sqrt{x^2 - 3x}}{3x-5}$ is (are)

5. If $y = x^{\sin 3x}$, then $y' =$

6. If $y = \ln(e^{-5x} + 3x)$, then $y' =$

7. The derivative of $f(x) = \sqrt{x^2 - 1}\,(\sec^{-1} x)$ is

$f'(x) =$

8. If $f(x) = 3\,e^{-4x}$ then $f^{(15)}(-1)$

9. If $g(x) = (1 + x^3)$ and $f(x) = x^{1/4}$, then

$$\frac{d}{dx} f(g(x)) =$$

Part II. Give detailed solutions for questions 10-12. Each question is worth 4 points

10. Find the points on the curve $x^2 + 3y^2 = 1$ where the tangent line has slope 1 and find equations of these two tangent lines.

11. If $f(x) = \ln(\sin(3x))$, find $f''(x)$.

12. Use a linear approximation to estimate $\cot(44^{0})$.

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excellent

نور عرفات

Jordan University
Mathematics Department
Calculus I, Second Exam, 10/5/2014 (IV)

Student's Name: Noor Arafat. Student Number: 0131914.

Lecture Time: 10 - 11

Q1) (1.5 points each) Fill in the blanks:

1) If $f(x) = \sin^{-1}(x^5)$, then $f'(x) =$ $\frac{1}{\sqrt{1-(x^5)^2}} \cdot 5x^4$ $= \boxed{\frac{1}{\sqrt{1-x^{10}}} \cdot 5x^4}$

2) If $f(x) = \log_3(x^5 + x)$, then $f'(x) =$ ______.

3) If $2^y = xy - 4$, then $\frac{dy}{dx} =$ $\frac{y}{2^y \cdot \ln 2 - x}$

4) If $f(x) = \tan^9(x)$, then $f'(x) =$ ______ $= 9(\tan(x))^8 \cdot \sec^2 x$

5) If $f(x) = g(x^3 + 3)$ and $g'(4) = 7$, then $f'(1) =$ $7 \times 3 = \boxed{21}$

6) $f(x) = \frac{\sin(x)}{x^2 - x}$ has removable discontinuity at $x =$ 0.

7) $\lim_{x\to1} \frac{\sin(x^2 + x - 2)}{x - 1} =$ 3.

8) If $\sinh(x) = -5$, then $\cosh(x) =$ $+\sqrt{26}$

9) The solution of the equation $\sinh(x) = 6$ is $x =$ $\boxed{\cancel{\frac{\ln 12}{2}}}$ $\frac{\ln(12 \pm \sqrt{148})}{2}$

$\boxed{2 \cdot \ln 9}$ 10) $\lim_{x\to0} \frac{9^x - 1}{x} =$ $9 \cdot \ln 9$

2×6 $\boxed{10}$ 11) If $f(x) = \begin{cases} x^2, & x \neq 5, \\ 25, & x = 5. \end{cases}$, then $f'(5) =$ 0

12) $\lim_{y\to0} \frac{\sin^2(z + y) - \sin^2(z)}{y} =$ $2\sin(z)\cos(z)$

13) If $f(5) = 6$ and $f'(5) = 3$, then $(f^{-1})'(6) =$ $\boxed{\frac{1}{3}}$.

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(2) $\frac{(5x^4 + 1)}{(x^5 + x) \cdot \ln 3}$

(3) $y' = \frac{y}{y^2 \cdot \ln 2 - x}$

Q2) (5 points) Find $\lim_{x\to-\infty} (\sqrt{x^2-7x}+x)$ $= \infty - \infty$!!

$$= \lim_{x\to-\infty} \sqrt{x^2-7x}+x \ * \left(\frac{\sqrt{x^2-7x}-x}{\sqrt{x^2-7x}-x}\right)$$

نضرب بالمرافق

$$= \lim_{x\to-\infty} \frac{\cancel{x^2}-7x-\cancel{x^2}}{\sqrt{x^2-7x}-x}$$

$$= \lim_{x\to-\infty} \frac{-7x}{\left(\sqrt{x^2}\cdot\sqrt{1-7/x}\right)-x} = \lim_{x\to-\infty} \frac{-7x}{\left(|x|\cdot\sqrt{1-7/x}\right)-x}$$

$$= \lim_{x\to-\infty} \frac{-7x}{-x\sqrt{1-7/x}-x} = \lim_{x\to-\infty} \frac{-7\cancel{x}}{-\cancel{x}\left(\sqrt{1-7/x}+1\right)}$$

$$= \frac{7}{\sqrt{1}+1} = \boxed{\frac{7}{2}}$$

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Q3) (6 points) Find the linear approximation of $f(x) = \cos(x)$ at $x = 60°$ and use it to approximate $\cos(58°)$.

$$F(x) = F(a) + F'(a)(x-a)$$

$$\cos(58°) = \frac{1}{2} + \frac{-\sqrt{3}}{2}(58-60) * \frac{\pi}{180}$$

$$= \frac{1}{2} - \frac{\sqrt{3}}{\cancel{2}} * -\cancel{2} * \frac{\pi}{180}$$

$$= \frac{1}{2} + \frac{\sqrt{3}\,\pi}{180}$$

$$\boxed{\cos(58°) = \frac{90+\sqrt{3}\,\pi}{180}}$$

$a = 60$

$x = 58$

$F(x) = \cos x$

$F'(x) = -\sin x$

$F(a) = \cos 60 = \frac{1}{2}$

$F'(a) = -\sin 60 = \frac{-\sqrt{3}}{2}$

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اسئلة سنوات

Past Papers

إعداد :

zenon

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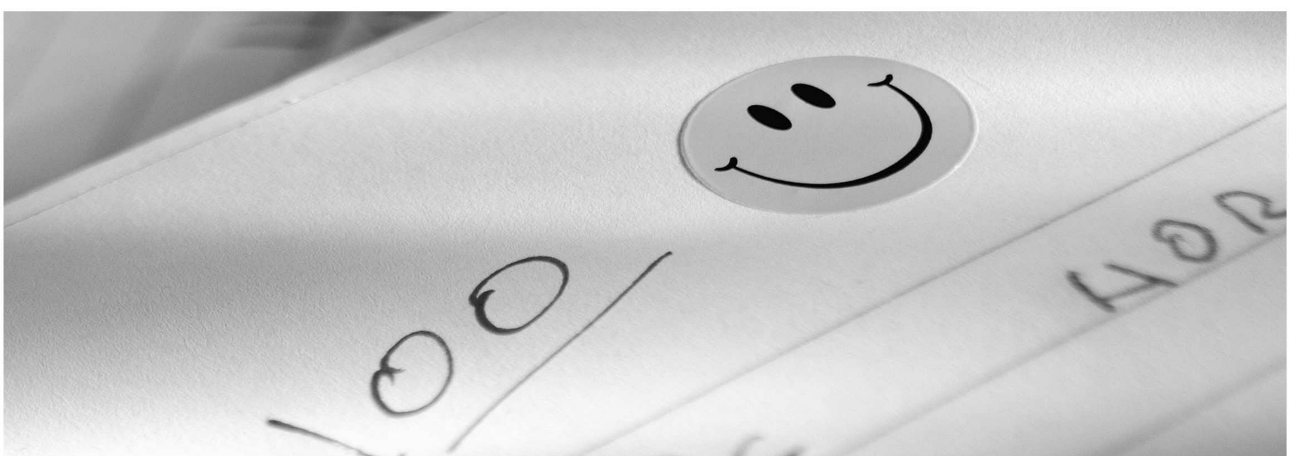

Calculus
Second

University of Jordan
Department of Mathematics
Math 101

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Name: [redacted] NUMBER: [redacted] Section: 29/11/2008

File no. 21

Q1. $\lim\limits_{x\to 0} \dfrac{1-\cos 4x}{1-\cos 2x} = $ ....4....

Q2. $\lim\limits_{x\to 1^+} e^{\frac{1}{1-x}} = $ ....$\cancel{\infty}$....

Q3. $\lim\limits_{x\to\infty} \tan^{-1}(x^2+x^4) = $ ....$\cancel{0}$....

Q4. If $\lim\limits_{x\to 2} \dfrac{f(x)}{x-2} = 5$, then $\lim\limits_{x\to 2} \dfrac{xf(x)}{x^2-4} = $ ....$10/4 = \frac{5}{2}$....

Q5. $\dfrac{d}{dx}\left(\sin^{-1}(e^{3x})\right) = $ ....$\cancel{\dfrac{3e^{6x}}{2\sqrt{(1-e^{6x})^3}}}$.... $= \dfrac{\left(\sqrt{1-e^{6x}}\right)\left(9e^{3x}\right) - \left(3e^{3x}\right)\left(\dfrac{-6e^{6x}}{2\sqrt{1-e^{6x}}}\right)}{1-e^{6x}}$

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Q6. If $y = \frac{3}{2}x + 6$ is tangent to $y = c\sqrt{x}$ at $x = 4$, then $c = $ ....6....

Q7. If $f(x) = \dfrac{1}{x^2+2x+a}$ has only one vertical asymptote, then $a = $ ....1....

Q8. Find $\dfrac{d^{200}}{dx^{200}}\left(2x^{100} + \cos x + 3^x\right)$

$$\frac{d^{200}}{dx^{200}}\left(2x^{100}\right) + \frac{d^{200}}{dx^{200}}\left(\cos x\right) + \frac{d^{200}}{dx^{200}}\left(3^x\right)$$

$$0 + \cos x + 3^x\left(\ln(3)\right)^{200}$$

Q9. Find all horizontal asymptotes of $f(x) = \dfrac{x+2}{\sqrt{16x^2+1}}$

$\lim_{x\to\infty} f(x)$ & $\lim_{x\to-\infty} f(x)$

$$\lim_{x\to\infty} \frac{x+2}{\sqrt{16x^2+1}} = \lim_{x\to\infty} \frac{x+2}{|x|\sqrt{16+\frac{1}{x^2}}} = \lim_{x\to\infty} \frac{\cancel{x}(1+\frac{2}{x})}{\cancel{x}(\sqrt{16+\frac{1}{x^2}})} = \frac{1+0}{\sqrt{16+0}}$$

$$= \frac{1}{4}$$

$$\lim_{x\to-\infty} \frac{x+2}{\sqrt{16x^2+1}} = \lim_{x\to-\infty} \frac{x(1+\frac{2}{x})}{|x|\sqrt{16+\frac{1}{x^2}}} = \lim_{x\to-\infty} \frac{\cancel{x}(1+\frac{2}{x})}{-\cancel{x}(\sqrt{16+\frac{1}{x^2}})}$$

$$= \frac{-(1+0)}{\sqrt{16+0}} = \frac{-1}{4}$$

$y = \frac{1}{4}$ & $y = \frac{-1}{4}$ is a hor. asy.

Q10. Find the linear approximation of $f(x) = \sqrt[3]{x+1}$ at $a = 0$ and use it to estimate $\sqrt[3]{0.9}$

$f(x) = \sqrt[3]{x+1} = (x+1)^{\frac{1}{3}}$

$f'(x) = \frac{1}{3}(x+1)^{-2/3} = \dfrac{1}{3\sqrt[3]{(x+1)^2}}$

$\sqrt[3]{x+1} = \sqrt[3]{0.9}$

$x+1 = 0.9$

$\boxed{x = 0.9 - 1 = -0.1}$

$f(0) = 1$

$f'(0) = \frac{1}{3}$

$L(x) = f(a) + f'(a)(x-a)$

$L(x) = 1 + \frac{1}{3}(x-0)$

$L(-0.1) = 1 + \frac{1}{3} * -\frac{1}{10}$

$= 1 - \frac{1}{30} \approx 0.9667$