Serial No.:_____ Student Name:_____ Student Number: _____

Instructor: M. Z. Abu-Sbeih Math 101- Q3 Date: 7-4-2007

Problem 1: (4 points) Find the limit if it exists.

(a) $\lim_{x\to\pi/4} \dfrac{\sin x - \cos x}{\cos 2x}$

(b) $\lim_{x\to 0} \dfrac{\sin 2x}{x + 2\tan 2x}$

Problem 2: (5 points)

(a) If $f(x) = \sqrt{x}\, e^{x+1} + \pi^3$ find $f'(1)$

(b) Find equations of both lines through the point (1,-3) that are tangent to the parabola $y = x^2$.

Problem 3: (3 points) A ball is thrown straight up from the ground. Its distance from the ground at time *t* is $s(t) = 5 + 36t - 6t^2 + \dfrac{t^3}{3}$.

(a) Find the maximum height that the point can reach.

(b) Find the velocity of the ball when it hits the ground.

Problem 4: (4 points) Find y'. DO NOT SIMPLIFY.

(a) $y = \left(\dfrac{\sqrt{x}}{x^2 - x}\right)^2$

(b) $y = \sec^3(\sin x)$

(c) $y = 2^{x+\tan x}$

(d) $y = \csc^2 x^3$

Problem 5: (4 points) If $f(3) = 2,\ f'(3) = 1,\ g(3) = 3$ and $g'(3) = 4$, find

1. $\dfrac{d}{dx}\left(f(x^2 - 2x)\right)_{x=3}$

2. $\dfrac{d}{dx}\left(\dfrac{e^x g}{f}\right)_{x=3}$

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Problem 1: (4 points) Find the limit if it exists. $\lim_{x\to 0}\dfrac{\sin 2x}{x+2\tan 2x}$

Problem 2: (6 points)

(a) If $f(x)=\sqrt{x}\,e^{x+1}+\pi^3$ find $f'(1)$

(b) Find equations of both lines through the point (1,-3) that are tangent to the parabola $y=x^2$.

Problem 3: (4 points) A ball is thrown straight up from the ground. Its distance from the ground at time *t* is $s(t)=8+36t-6t^2+\dfrac{t^3}{3}$.

(a) Find the maximum height that the point can reach.

(b) Find the velocity of the ball when it hits the ground.

Problem 4: (8 points) Find y'. DO NOT SIMPLIFY.

(a) $y=\left(\dfrac{\sqrt{x}}{x^2-x}\right)^2$

(b) $y=\sec^3(\cot x)$

(c) $y=2^{x+\tan x}$

(d) $y=\csc^2 x^3$

Problem 5: (3 points) If $f(3)=2,\ f'(3)=1,\ g(3)=3$ and $g'(3)=4$, find $\dfrac{d}{dx}\left(\dfrac{g(x^2-2x}{f(x)}\right)_{x=3}$

Serial No.:_____ Student Name:_____ Student Number: _____

Problem 1: (4 points) Find the limit if it exists. $\lim_{x \to \pi/4} \dfrac{\sin x - \cos x}{\cos 2x}$

Problem 2: (6 points)

(a) If $f(x) = \sqrt{x}\, e^{x-1} - \pi^3$ find $f'(1)$

(b) Find equations of both lines through the point (1,3) that are tangent to the parabola $y = -x^2$.

Problem 3: (4 points) A ball is thrown straight up from the ground. Its distance from the ground at time *t* is $s(t) = 5 + 36t - 6t^2 + \dfrac{t^3}{3}$.

(a) Find the maximum height that the point can reach.

(b) Find the velocity of the ball when it hits the ground.

Problem 4: (8 points) Find y'. DO NOT SIMPLIFY.

(a) $y = \left(\dfrac{\sqrt{x}}{x^2 + x} \right)^3$

(b) $y = \sec^4(\cos x)$

(c) $y = 2^{x + \cot x}$

(d) $y = \csc^2 x^3$

Problem 4: (3 points) If $f(3) = 2,\ f'(3) = 1,\ g(2) = 3$ and $g'(2) = 4$, find $\dfrac{d}{dx}\left(\dfrac{f(x^2 - 2x)}{g(x)} \right)_{x=3}$