MAT 1320, Winter 2014 Midterm Exam 2
Wednesday March 19

For rough work, you may use back pages or else, ask me for scrap paper.

Last Name _____ First Name _____ Student Number _____

By signing below, you declare that this work was your own and that you have not copied from any other individual or other source.

Signature
_____(should match the signature that you sign on the attendance sheets.)

Questions 1–4 are multiple-choice (5 points each). You must enter the letter corresponding to each correct answer in the table below. No partial marks will be given for other work.

Problem	1 (5 pts.)	2(5 pts.)	3(5 pts.)	4(5 pt.)
Your answer	D	D	A	A
Your marks				

Question 1. *Determine the derivative of* $f(x) = sin^{-1}(2x) = arcsin(2x)$ *with respect to* x.
(a) $\frac{1}{\sqrt{1-x^2}}$ **(b)** $\frac{2}{\sqrt{1-x^2}}$ **(c)** $\frac{1}{\sqrt{1-4x^2}}$ **(d)** $\frac{2}{\sqrt{1-4x^2}}$ **(e)** $\frac{9}{1-9x^2}$ **(f)** $\frac{9}{\sqrt{1-9x^2}}$

Question 2. *Find the slope of the tangent line to the curve* $y = e^{1+x^2}\ln(1+x^2)$ *at the point* $x = 2$.
(a) $\ln(2)$ **(b)** 1 *(c)* π **(d)** 0 **(e)** $e^2\ln(2)$ **(f)** 1

Question 3. *A particle moves with acceleration function* $a(t) = \sin t - 3\cos t$. *Its initial velocity is* $v(0) = 2$ *m/s and its initial displacement is* $s(0) = 5$ *m. Find its position after* π *seconds.*
(a) $3\pi - 1$ **(b)** $3\pi + 1$ **(c)** *0* *(d)* π **(e)** $\pi + 1$ **(f)** $\pi - 1$

Question 4. *Evaluate the area between the* x*-axis and* $f(x) = -x^2 + 4x - 3$ *from* $x = 1$ *to* $x = 3$.
(a) 4/3 **(b)** 3/4 *(c)* 0 **(d)** 5/4 **(e)** 4/5 **(f)** 1/2

Questions 5-12 are long-answer (10 points each). You must clearly show all relevant steps and justify your solution to receive full marks. Clearly indicate the final answer.

Question 5. *Find the derivative of the function*

$$y = (\sin x)^{x^2}.$$

Question 6. **(a)** *Find the linearization of* $f(x) = \sqrt[3]{1+3x}$ *at* $a = 0$, *and state the corresponding linear approximation.*

(b) *Use part (a) to give an approximate value for* $\sqrt[3]{1.03}$.

Question 7. *Evaluate the following limit by first recognizing the sum as a Riemann sum for a function defined on* $[0, 1]$.

$$\lim_{n\to\infty} \frac{1}{n}\left(\sqrt[3]{\frac{1}{n}} + \sqrt[3]{\frac{2}{n}} + \sqrt[3]{\frac{3}{n}} + \cdots + \sqrt[3]{\frac{n-1}{n}} + \sqrt[3]{\frac{n}{n}}\right)$$

Question 8. *Compute the derivative of the function given by*

$$g(x) = \int_1^{x^3} \sin(1-t^2)\,dt.$$

Question 9. *Find the area of the region bounded by the graphs of* $f(x) = x^2 + 2$, $g(x) = -x$, $x = 0$, *and* $x = 1$.

Question 10. *Evaluate*

$$\int \frac{-4x}{(1-2x^2)^2}\,dx.$$

Question 11. *Evaluate*

$$\int_1^2 \frac{1}{x\left(1+(\ln x)^2\right)}\,dx$$

Question 12. *Evaluate*

$$\int_0^{\pi/2} \sin x \, \cos(\cos x) \, dx$$

Problem	5(10 pts.)	6(10 pts.)	7(10 pts.)	8(10 pts.)	9(10 pts.)	10(10 pts.)	11(10 pts.)	12(10 pts.)
Your marks								

Student Last,First Name:_____ Total marks: _____ out of 100

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Your answer	F	C	F	B
Your marks				

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Question 2. *Find the slope of the tangent line to the curve* $y = e^{1+x^4}\ln\left(1+x^4\right)$ *at the point* $x = 0$.
(a) $\ln(2)$ **(b)** 1 *(c)* 0 **(d)** 0π **(e)** $e^2\ln(2)$ **(f)** 1

Question 3. *A particle moves with acceleration function* $a(t) = \cos t - 3\sin t$. *Its initial velocity is* $v(0) = 2$ *m/s and its initial displacement is* $s(0) = 5$ *m. Find its position after* π *seconds.*
(a) $3\pi - 1$ **(b)** $3\pi + 1$ **(c)** $\pi - 7$ *(d)* π **(e)** $\pi + 7$ **(f)** $7 - \pi$

Question 4. *Evaluate the area between the* x*-axis and* $f(x) = -x^2 + 4x - 3$ *from* $x = 1$ *to* $x = 3$.
(a) 3/4 **(b)** 4/3 *(c)* 5/4 **(d)** 0 **(e)** 4/5 **(f)** 1/2

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Question 5. *Find the derivative of the function*

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Question 7. *Evaluate the following limit by first recognizing the sum as a Riemann sum for a function defined on* $[0, 1]$.

$$\lim_{n\to\infty} \frac{1}{n}\left(\sqrt[5]{\frac{1}{n}} + \sqrt[5]{\frac{2}{n}} + \sqrt[5]{\frac{3}{n}} + \cdots + \sqrt[5]{\frac{n-1}{n}} + \sqrt[5]{\frac{n}{n}}\right)$$

Question 8. *Compute the derivative of the function given by*

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$$\int \frac{1}{e^x\,(1+(e^x)^2)}\,dx\,.$$

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$$\int_0^{\pi/2} \cos x \, \sin(\sin x) \, dx$$

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Your marks								

Student Last,First Name:_____ Total marks: _____ out of 100