

Name: \_\_\_\_\_

Instructor-section:     Bullwinkle    

**Math 125, Test I**

September 24, 1998

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for one hour.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 11 pages of the test.

Good Luck!

1.	(a)	(b)	(c)	(d)	(e)	(f)
2.	(a)	(b)	(c)	(d)	(e)	(f)
3.	(a)	(b)	(c)	(d)	(e)	(f)
4.	(a)	(b)	(c)	(d)	(e)	(f)
5.	(a)	(b)	(c)	(d)	(e)	(f)
6.	(a)	(b)	(c)	(d)	(e)	(f)
7.	(a)	(b)	(c)	(d)	(e)	(f)
8.	(a)	(b)	(c)	(d)	(e)	(f)

Total multiple choice:	_____
9.	_____
10.	_____
11.	_____
12.	_____
13.	_____
14.	_____
<b>Total:</b>	_____

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**Multiple Choice**

1.(5pts)

$$\lim_{z \rightarrow 0} \frac{1 - \cos(9z)}{z} = ?$$

(a) -1

(b) 0

(c) 1

(d) 9

(e) Does not exist.

2.(5pts)

$$\lim_{u \rightarrow 4} \frac{u^2 + x^2}{2u + x^2} = ?$$

(a) -2

(b) 1

(c)  $\frac{16 + x^2}{8 + x^2}$

(d)  $\frac{u^2 + 16}{2u + 16}$

(e) Does not exist.

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3.(5pts)

$$\lim_{t \rightarrow 3^-} \frac{\sqrt{t} + \sqrt{3}}{t - 3} = ?$$

(a)  $-\infty$

(b)  $+\infty$

(c)  $\frac{1}{\sqrt{3}}$

(d)  $\sqrt{3}$

(e) Does not exist.

4.(5pts)

$$\frac{d \sin(x^2)}{dx} = ?$$

(a)  $\cos(x^2)$

(b)  $\cos(2x)$

(c)  $x^2 \cos(x)$

(d)  $2 \sin(x)$

(e)  $2x \cos(x^2)$

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5.(5pts) If  $y$  is defined implicitly as a function of  $x$  by the equation

$$x^2 - y^2 = 2xy - 2$$

then  $\frac{dy}{dx}$  evaluated at the point  $(1, 1)$  is

- (a)  $-1$                       (b)  $0$                       (c)  $1$                       (d)  $2$                       (e)  $2/3$

6.(5pts) Suppose  $f$  and  $g$  are two functions which are differentiable at  $3$ . If  $f(3) = 1$ ,  $f'(3) = 2$ ,  $g(3) = 4$  and  $g'(3) = -1$ ,

$$\left(\frac{f}{g}\right)'(3) = ?$$

- (a)  $\frac{1}{4}$                       (b)  $\frac{5}{16}$                       (c)  $\frac{9}{16}$                       (d)  $\frac{8}{3}$                       (e) Can not be determined from the information given.

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7.(5pts)

$$\frac{d(x^2 + 2)(x^3 + 2x + 1)^{45}}{dx} = ?$$

- (a)  $(2x(x^3 + 2x + 1) + 45(x^2 + 2)(3x^2 + 2))(x^3 + 2x + 1)^{44}$
- (b)  $(2(x + 1)(x^3 + 2x + 1) + 45(x^2 + 2))(x^3 + 2x + 1)^{44}$
- (c)  $90x(x^3 + 2x + 1)^{44}$
- (d)  $(2x + 45(x^3 + 2x + 1)^{44})(x^2 + 2)(x^3 + 2x + 1)^{45}$
- (e)  $45(x^2 + 2)^{44} + (3x^2 + 2)$

8.(5pts) The derivative of

$$\frac{d(x + \tan x)}{dx}$$

evaluated at  $x = 0$  is

- (a)  $-2$                       (b)  $0$                       (c)  $4/\pi$                       (d)  $\pi/4$                       (e)  $2$

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**Partial Credit**

9.(10pts) Is the function

$$f(x) = \begin{cases} \frac{\sin 2x \cos 4x}{x} & 0 < x \leq \pi/4 \\ 2 & x = 0 \end{cases}$$

continuous on the entire interval  $[0, \pi/4]$ ? Why or why not?

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10.(10pts) Write an equation for the line tangent to the ellipse  $9x^2 + 5y^2 = 270$  at the point  $(5, 3)$ .

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11.(10pts) Use the **definition of derivative** to find  $f'(3)$ , where

$$f(x) = \sqrt{2x + 3} .$$



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12.(10pts) The function

$$f(x) = \begin{cases} x^2 + ax + 1 & x \leq 1 \\ x^3 - 1 & x > 1 \end{cases}$$

is continuous on  $(-\infty, \infty)$  for a unique number  $a$ . Find  $a$ .

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13.(10pts) The position of a particle moving along the  $x$ -axis is given by

$$x(t) = t^5 - 5t + 1 .$$

Find the particle's acceleration at each time when the instantaneous velocity of the particle is 0.

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14.(10pts) If

$$x^4 - y^4 = 4xy - 4 ,$$

find  $d^2y/dx^2$  at the point  $(1, 1)$ .

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