Answer Key 1

Math 20-550: Calculus Name:_____

Exam II *October 25, 2005* Class time (MWF):_____

Please sign the honor statement if you agree:

"I strictly followed the Notre Dame Honor Code during this test."

Your Signature _____

number right times 6 = _____

11.

12.

13.

You start with: 10 points

Total Score _____

1.	•	b	c	d	e	6.	•	b	c	d	e
2.	•	b	c	d	e	7.	•	b	c	d	e
3.	•	b	c	d	e	8.	•	b	c	d	e
4.	•	b	c	d	e	9.	•	b	c	d	e
5.	•	b	c	d	e	10.	•	b	c	d	e

Math 20-550: Calculus Name:_____

Exam II *October 25, 2005* Class time (MWF):_____

Please sign the honor statement if you agree:

"I strictly followed the Notre Dame Honor Code during this test."

Your Signature _____

number right times 6 = _____

11.

12.

13.

You start with: 10 points

Total Score _____

1.	a	b	c	d	e	6.	a	b	c	d	e
2.	a	b	c	d	e	7.	a	b	c	d	e
3.	a	b	c	d	e	8.	a	b	c	d	e
4.	a	b	c	d	e	9.	a	b	c	d	e
5.	a	b	c	d	e	10.	a	b	c	d	e

1. Find the limit

$$\lim_{(x,y,z)\to(2,0,1)} e^{-xy}\sin(\pi z/2)$$

(a) 1 (b) 0 (c) e

(d) e^2 (e) does not exist

2. Use implicit differentiation to find $\dfrac{\partial z}{\partial y}$, where $x^2 + xyz - x^3y^2 = yz$.

(a) $-\dfrac{xz - 2x^3y - z}{xy - y}$ (b) $\dfrac{xz - 2x^3y - z}{xy - y}$ (c) 0

(d) $\dfrac{x^2 - xy - x^3y^2}{xy - y}$ (e) $-\dfrac{x^2 - xy - x^3y^2}{xy - y}$

3. If $z = f(x, y)$, where f is differentiable, $x = g(t)$, $y = h(t)$, $g(3) = 2$, $g'(3) = 5$, $h(3) = 7$, $h'(3) = -4$, $f_x(2, 7) = 6$ and $f_y(2, 7) = -8$, find $\dfrac{dz}{dt}$ when $t = 3$.

(a) 62 (b) 6 (c) -2 (d) 3 (e) 7

4. Find the maximum rate of change of $f(x, y) = \sin(xy)$ at $(0, 1)$.

(a) 1 (b) 0 (c) -1 (d) $\sin 1$ (e) $-\sin 1$

5. Find the equation for normal line at the point $(-3, 1, -2)$ to the ellipsoid

$$\frac{x^2}{9} + y^2 + \frac{z^2}{4} = 3.$$

(a) $\dfrac{x+3}{-\frac{2}{3}} = \dfrac{y-1}{2} = \dfrac{z+2}{-1}$

(b) $\dfrac{x+2}{-1} = \dfrac{y-1}{2} = \dfrac{z+3}{-\frac{2}{3}}$

(c) $\dfrac{x-\frac{2}{3}}{-1} = \dfrac{x-2}{1} = \dfrac{z-1}{-2}$

(d) $\dfrac{2}{9}(x+3) + 2(y-1) - \dfrac{1}{2}(z+2) = 0$

(e) $(x+3) + (y-1) + (z+2) = 0$

6. Suppose that $(0, 2)$ is a critical point of function $f(x, y)$ with continuous second derivatives, where $f_{xx}(0, 2) = -1$, $f_{xy}(0, 2) = 2$, $f_{yy}(0, 2) = -8$. Classify the type of critical point $(0, 2)$.

(a) a local maximum

(b) a local minimum

(c) a saddle point

(d) an absolute minimum

(e) inconclusive

7. Evaluate the integral $\int\int_D xydA$ where D is the disk with center the origin and radius 3.

(a) 0 (b) 9π (c) 3π (d) π (e) 1

8. The maximum value of $f(x, y, z) = (xyz)^{\frac{1}{3}}$ for $x > 0$, $y > 0$, $z > 0$ and $x + y + z = 1$ is

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 0 (d) ∞ (e) 1

9. If $f(x, y) = xe^y$, find the rate of change of f at the point $P = (2, 0)$ in the direction from P to $Q = (\frac{1}{2}, 2)$. (Hint: $\vec{u} = \frac{Q - P}{|Q - P|}$).

(a) 1 (b) 5 (c) $\frac{1}{2}$ (d) 2 (e) 0

10. Find f_{xx} if $f(x, y) = \int_x^y \cos(t^2)dt$.

(a) $2x\sin(x^2)$ (b) $\cos(x^2)$ (c) 0

(d) $-2t\sin(x^2)$ (e) $\tan(x^2)$

11. A rectangular box without lid is to be made from 48 cm^2 of cardboard. Find the maximum volume of such a box.

12. Evaluate the integral $\int_0^1 \int_{3y}^3 e^{x^2} dxdy$ by the reversing the integral.

13. Let

$$E = \{(x, y, z) \,|\, x \geq 0,\ y \geq 0,\ z \geq 0,\ x^2 + y^2 \leq 1,\ x^2 + z^2 \leq 1\}.$$

Write a double integral in the form of $\displaystyle\int\int_D f(x, y)dA$, which gives the volume of the solid E.