

Jeopardy

WES 234 Fall 2006

**UW Madison
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THE CATEGORIES

- Vectors and Operators (3-7)
- Derivatives (8-12)
- Maxima and Minima (13-17)
- Integrals (18-22)
- Green, Gauss, and Stokes (23-27)

VECTORS AND OPERATORS 100

The cosine of the angle between $\vec{u} = \langle 2, 2, -1 \rangle$ and $\vec{v} = \langle 4, -3, -1 \rangle$.

VECTORS AND OPERATORS 200

The line written in symmetric form of the intersection of the two planes
 $x - 3y + z = -1, 6x - 5y + 2z = 10.$

VECTORS AND OPERATORS 300

The velocity, speed, and acceleration of

$$4t \hat{i} + 5(t^2 - 1) \hat{j} + 2t \hat{k}$$

at time $t_1 = 1$.

VECTORS AND OPERATORS 400

The graphs of $x^2 + y^2 + z^2 = 0$ and $x^2 + y^2 - z^2 = 0$.

VECTORS AND OPERATORS 500

The great circle distance between the points (longitude $90^\circ W$, latitude $60^\circ N$) and (longitude $0^\circ E$, latitude $60^\circ N$) on an asteroid of radius 1 meter.
(Note: don't evaluate \cos^{-1})

DERIVATIVES 100

The gradient of $2\hat{i} + 3x\hat{j} + 2yz\hat{k}$.

DERIVATIVES 200

The equation for $\frac{dz}{dt}$ if $z = f(x, y)$, $x = x(t)$, and $y = y(t)$.

DERIVATIVES 300

A proof that $\lim_{(x,y) \rightarrow (0,0)} \frac{x+y}{x^2-y^2}$ does not exist.

DERIVATIVES 400

A proof that the vector function $\langle \frac{x^3}{3}, 1/y, \frac{2}{x-y} \rangle$ is differentiable everywhere in the second quadrant.

DERIVATIVES 500

All points on the surface $0 = -z + 2x^2 + 3y^2$ where the tangent plane is parallel to the plane $8x - 4y - z = 1$.

MAX AND MIN 100

The three types of Critical points when testing for max and mins.

MAX AND MIN 200

The maximum and minimum of $f(x) = x^2 + x + 2$ on the interval $[-3, 1]$

MAX AND MIN 300

The minimum temperature on the curve $xy - 3 = 0$, if the temperature is given by $T(x, y) = x^2 + y^2$.

MAX AND MIN 400

The local minima and maxima of the function $f(x, y) = x^3 + y^3 - 6xy$.

MAX AND MIN 500

The formula for curl.
(SURPRISE!)

INTEGRALS 100

Find the surface area of the part of the plane $z = x + y$ lying above the region $0 \leq x \leq 1, 0 \leq y \leq 1$.

INTEGRALS 200

The arc length of the curve $x = \frac{\sqrt{2}}{2}t^2, y = t^3/3 - t$ from $t = 0$ to $t = 1$.

INTEGRALS 300

The value of $\int_0^3 \int_0^{9-y^2} e^{x^2+y^2} dx dy$

INTEGRALS 400

$I_x/2^8$ for the lamina bounded by $y = x^2$ and $y = 4$, with density $\delta = 3$.

INTEGRALS 500

The equation for the volume of the solid in the first octant bounded by the surface $-x^2 - y + z = 0$.

GAUSS, ETC 100

A name given to forces whose work is zero along any closed paths.

GAUSS, ETC 200

The two quantities that Gauss' Theorem relates via integrals.

GAUSS, ETC 300

The two quantities that Stokes' Theorem relates via integrals.

GAUSS, ETC 400

Two conditions which are satisfied by a conservative function.

GAUSS, ETC 500

The total flux of the vector field $\vec{F} = x\hat{i} + y\hat{j} + z\hat{k}$ through the solid
 $S = \{(x, y, z) : x^2 + y^2 + z^2 \leq 1\}$