A Tale of Two Workshops

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Two Workshops

2004: Very successful PREP workshop

2007: Tried to repeat our success, but...
... canceled due to low enrollment

The Vector Calculus Bridge Project

- **Differentials** *(Use what you know!)*
- **Multiple representations**
- **Symmetry** *(adapted bases, coordinates)*
- **Geometry** *(vectors, div, grad, curl)*
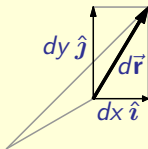
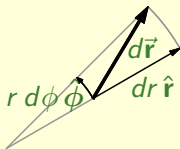- Small group activities
- Instructor's guide
- Online text (http://www.math.oregonstate.edu/BridgeBook)

http://www.math.oregonstate.edu/bridge

DUE–0088901, DUE–0231032, DUE–0618877

Vector Differentials

$$d\vec{\mathbf{r}} = dx\,\hat{\boldsymbol{\imath}} + dy\,\hat{\boldsymbol{\jmath}}$$

$$d\vec{\mathbf{r}} = dr\,\hat{\mathbf{r}} + r\,d\phi\,\hat{\boldsymbol{\phi}}$$

$$
\begin{aligned}
ds &= |d\vec{\mathbf{r}}| \\
d\vec{\mathbf{A}} &= d\vec{\mathbf{r}}_1 \times d\vec{\mathbf{r}}_2 \\
dA &= |d\vec{\mathbf{r}}_1 \times d\vec{\mathbf{r}}_2| \\
dV &= (d\vec{\mathbf{r}}_1 \times d\vec{\mathbf{r}}_2) \cdot d\vec{\mathbf{r}}_3
\end{aligned}
$$

$$df = \vec{\nabla}f \cdot d\vec{\mathbf{r}}$$

The Hill

Suppose you are standing on a hill. You have a topographic map, which uses rectangular coordinates (x, y) measured in miles. Your global positioning system says your present location is at one of the points shown. Your guidebook tells you that the height h of the hill in feet above sea level is given by

$$h = a - bx^2 - cy^2$$

where $a = 5000$ ft, $b = 30\, \frac{\text{ft}}{\text{mi}^2}$, and $c = 10\, \frac{\text{ft}}{\text{mi}^2}$.
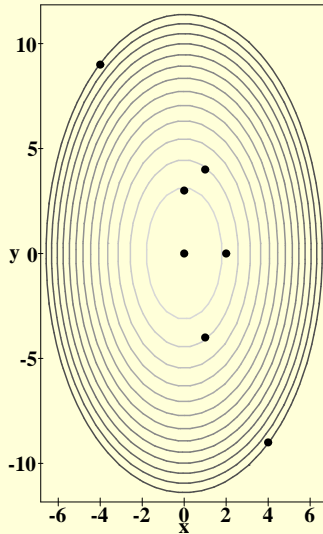
The Hill

- Starting at your present location, in what compass direction do you need to go in order to climb the hill as steeply as possible?

- How steep is the hill if you start at your present location and go in this compass direction?

- In what direction in space would you actually be moving if you started at your present location and walked in the map direction you found above?
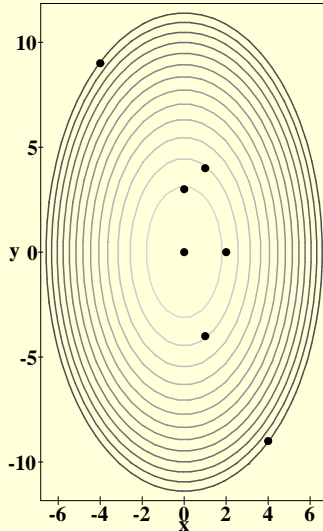
The Vector Calculus Bridge Project

Bridge Project homepage hits in 2009

Further Information

Reimagining Second-Year Calculus:
The Vector Calculus Bridge Project
Tevian Dray & Corinne A. Manogue
Saturday, 1/9/16, Room 2A, 1:00 PM

(MAA Session on Conversations with the Partner Disciplines:
Collaborations to Improve the Mathematics Curriculum)

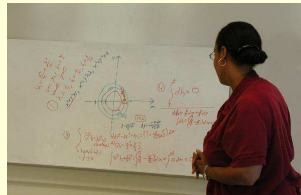`http://www.math.oregonstate.edu/bridge`

2004 Workshop

PREP Workshop
THE GEOMETRY OF VECTOR CALCULUS
Tevian Dray & Corinne A. Manogue
Mount Holyoke College
June 18–22, 2004

- Budget: $< \$20,000$
- 25 participants
- $3\frac{1}{2}$ days (with $\frac{1}{2}$ day open)
- 2 evening Review sessions
- Sessions on content, pedagogy, and practice instruction
- 2nd 3-day workshop on Bridge Project; first on East Coast.

2007 Workshop

PREP Workshop
THE GEOMETRY OF VECTOR CALCULUS
Tevian Dray & Corinne A. Manogue
Mount Holyoke College
June 19–23, 2007

- Same budget...
- Same schedule...
- 11 "participants"...
- canceled...

What Happened?

- **Saturation?**
  3-day workshops in 2003, 2004 (2x), 2005;
  mini-workshops in 2003, 2004 (3x), 2005 (2x)
  (but most on West Coast)

- **Too little advertising?**
  No targeted advertising beyond PREP;
  Lack of East Coast contacts

- **Obscure topic?**
  Second-year calculus...

- **Access to materials?**
  Activities available online;
  Text available online.

- **All of the above??**