Mathematics

1. ISODERIVATIVE CURVES.
George Bridgman, Waverly.

For a one-parameter family of curves, we define an isoderivative curve to be a curve connecting all those points where any member of the family has its derivative equal to a fixed value, V. For instance, the family (1) $y = Cx^2$ has derivative $y' = 2Cx$. If $y' = V$, then, by eliminating C from the equation $V = 2Cx$ and from (1), we produce the isoderivative "curve" $y = Vx/2$, which joins all points where the derivative of any curve (1) equals V. Just as isobars and isotherms on a weather map join points of equal pressure and equal temperature, respectively, so an isoderivative curve connects those points having "equal derivative." Isoderivative curves for the family $y = Cx^3$ have the form $y = Vx/3$; for the family $y = Cx^r$, $(r \neq 0)$, they have the form $y = Vx/r$; for $y = e^{Cx}$, the isoderivative curves have equation $Vx = y\,\mathrm{Ln}(y)$; and for the family $y = Cf(x)$, where $f(x)$ represents any differentiable function, the isoderivative curve equation is $y = Vf(x)/f'(x)$. We present further examples. We also solve the reverse problem of finding a family of differentiable curves $y = Cf(x)$ having a given equation $y = Vg(x)$ as its isoderivative curve. The solution is $y = Ce^{\int \frac{1}{g(x)}dx}$.

For example, if $y = Vx^2$ is the isoderivative curve equation, then the family having this equation as its isoderivative curve is $y = Ce^{-1/x}$. For $y = Vx^r$, $(r \neq 0)$, the family with that equation as its isoderivative curve is $y = Ce^{x^{1-r}/1-r}$

2. A MEAN VALUE THEOREM FOR INTEGRALS. Donald F. Bailey, Mt. Vernon

The classical mean value theorem for integrals is usually stated as follows.
If the function f is continuous on $[a,b]$ *then there exists* $z \in [a,b]$ *such that* $\int_a^b f(x)dx = f(z)(b-a)$.

The standard proof uses the following three facts, all of which are consequences of continuity of f on [a,b].
(1) f is integrable on [a,b] (and hence bounded).
(2) f satisfies the intermediate value property on [a,b].
(3) f assumes its maximum and minimum values on [a,b].
In this paper we show by means of a category argument that the proof need not use condition (3) and hence a stronger theorem holds.

3. A SIMPLIFIED PROOF OF BEZOUT'S THEOREM. Arnold Adelberg,* Grinnell

Bezout's theorem, concerning the number of intersections of n hypersurfaces in projective n-space, is one of the keystones of classical algebraic geometry. Traditionally, it was proved by projective methods. An alternate approach that has been used is to give a purely algebraic statement of the theorem that involves

3. Cont. the calculation of the dimension of a certain vector space, and to derive the result by using extensive machinery of homological algebra. The procedure we have followed is closely related to the second approach, but is more explicit and elementary than usual, and involves consideration of some exact sequences that arise naturally. A by-product is a proof that the normality of a sequence of polynomials and their homogenizations can be deduced from the normality of its sequence of highest forms.

4. A SMALL COLLEGE COOPERATIVE SEMINAR. E.T. Hill, Mount Vernon.

For the past two years the departments of mathematics at Coe and Cornell have been holding a weekly seminar. The participants feel that it is necessary for teachers of mathematics to also be mathematicians. The involvement of two departments in regularly scheduled sessions makes it less likely that the press of committee work and other duties will preempt the time scheduled for doing mathematics. Some difficulties have come up, but we feel the program is a success and highly recommend this format to other groups.

5. DENNIS R. STEELE, Lamoni.

No abstract available.