1067-J1-1053 **Duff Campbell*** (campbell@hendrix.eu), Dept. of Mathematics and Computer Science, 1600 Washington Ave., Conway, AR 72212. *Differential Equations as a basis for Calculus II.*

We have developed an approach to Calculus II which uses initial value problems (IVP's) to motivate most of the course. We start with population models $\frac{dP}{dt} = kP$ and $\frac{dP}{dt} = kP\left(1 - \frac{P}{N}\right)$. Graphical analysis is used to study the geometry of solutions. The need for analytic solutions leads to separation of variables and partial fractions. The standard exponential as introduced as the unique solution to the IVP $\frac{dy}{dt} = y$, $y(0) = 1$, and the natural logarithm is introduced as the unique solution to the IVP $\frac{dy}{dt} = \frac{1}{t}$, $y(1) = 0$. The Existence and Uniqueness Theorem for Diff. Eq. is used to show that the former behaves like an exponential and the latter behaves like a logarithm, as well as showing that these two functions are inverses of one another. Trigonometric functions are defined as pairs of functions which satisfy coupled IVP's. Tweaking these coupled IVP's leads to hyperbolic trigonometric functions, inverse trigonometric functions, and more. After the other standard analytic techniques (integration by parts, partial fractions, etc.) have been introduced, Picard iteration provides a segue from differential equations to sequences and power series. A variety of modeling problems are used throughout the course. (Received September 17, 2010)