Differential Equations

***SOLVE DIFFERENTIAL EQUATIONS BY SEPARATION OF VARIABLES***

 Put in Leibnitz notation so you can separate the variables.

 Now separate the variables.

 Integrate both sides.



 Solve for y.

 If you’re given an initial condition, use it to find *C*.

***SLOPE FIELDS: These are graphical interpretations of the solutions to differential equations.***

* The overall shape of the slope field represents the ***solution*** (family of solutions) to the differential equation.
* Each little segment in the slope field represents a tangent to one of the members of the family of curves.
* To match a slope field to its differential equation, start by evaluating the differential equation for specific values of *x* and *y*. It’s always good to start with *x* = 0 and *y* = 0 to see what the behavior of *dy/dx* would look like.

***EULER’S METHOD: This is a numerical method of approximating the value of a function given its derivative and an initial condition.***

Build a table! You will be given a “step,” which is *dx* (or Δ*x*) in order to find *dy*. Add *dy* to the

Previous *y* to obtain new *y*.

Find *y*(1.4) if , *y*(1) = 0 and *dx* = 0.2.

|  |  |  |  |
| --- | --- | --- | --- |
| *x* | *y* |  | *dy* |
| 1 | 0 |  |  |
| 1.2 |  |  |  |
| 1.4 |  |  |  |

***LOGISTICS DIFFERENTIAL EQUATIONS***

Differential equations in the form will model rates of change for growth that involves

carrying capacity.

* If the *P* inside the parenthesis has coefficient 1, then the constant *L* represents the carrying capacity, or limit to growth. As a result, , regardless of the initial population.
* The population is increasing fastest when .
* To solve this differential equation, separate the variables and integrate both sides.



Partial fractions will be the technique to use. You will not be asked to do this on the test because of time constraints! You will need to know about the first 2 bullets, though.