

Field Calculations: Creating Random Values

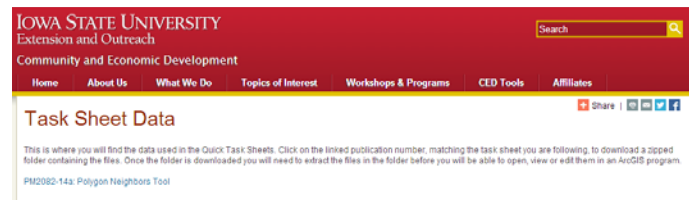
ArcGIS 10.4+

Welcome to the Essential ArcGIS Task Sheet Series. This series supplements the Iowa State University GIS Geospatial Technology Training Program short course series, “Essential ArcGIS Tutorial Series.” The task sheets are designed to provide quick, easy instructions for performing specific tasks in GIS.

Random values may be needed in an attribute table in order to analyzing specific scenarios. In ArcMap you can create random values using the field calculator and Python code. This task sheet will take you through those steps and demonstrate creating random integer values and random decimal values using Python in the field calculator.

1. Download the Data

- To download the data used in this task sheet, navigate to www.extension.iastate.edu/communities/gis/quicktasksheets/data in a web browser. Click on the publication number: **PM2082-16k**.
- When the download is complete, you will need to unzip the folder in order to access the files in ArcGIS. The folder contains a shapefile of the counties in Iowa.

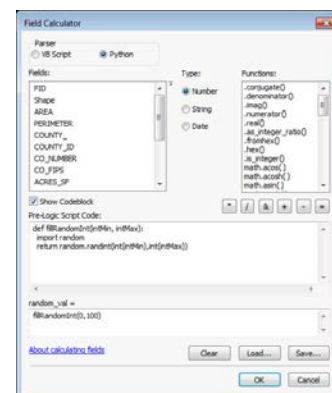
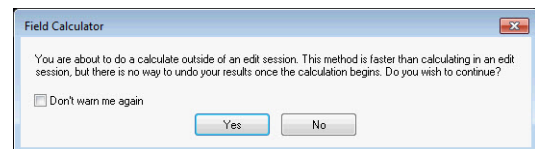
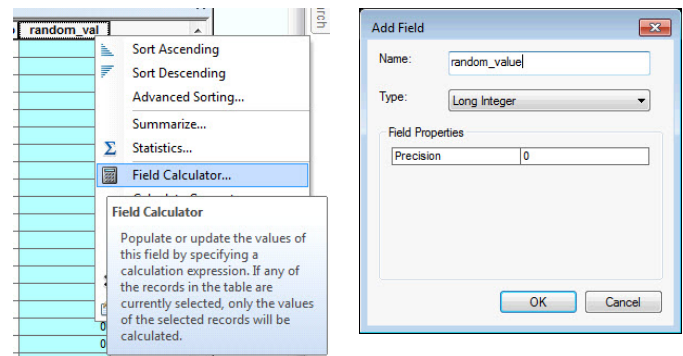


2. Calculate Random Numbers 0 - 100

- Open the attribute table for the **county** shapefile.
- Click on the **Table Options** icon in the top left corner of the attribute table, and select **Add Field**. In the **Name** text box, type in **random_value**. In the **Type** drop-down select **Long Integer** or **Short Integer**. Leave the default **Precision** and click **OK**. *Note: the random_value field name contains too many characters and will be shortened to random_val, unless your file is in a geodatabase.*
- Select the **random_val** field so it becomes highlighted, right-click, then select **Field Calculator**. If you get a warning message about calculating outside of an edit session, select **Yes** to continue.
- In the **Field Calculator** select **Python** as the **Parser** and check **Show Codeblock**. In the **Pre-Logic Script Code** section type in:

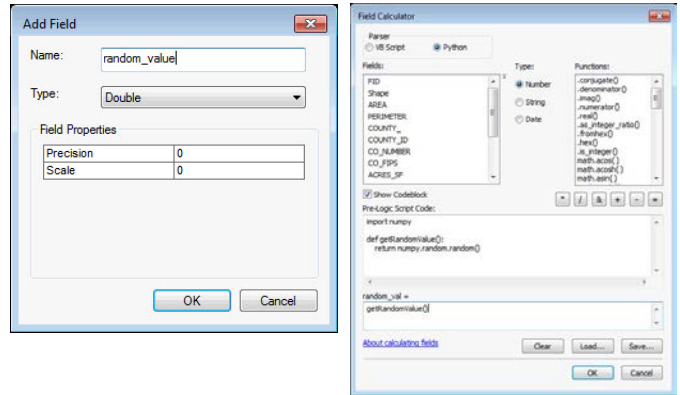
```
def fillRandomInt(intMin, intMax):
    import random
    return random.randint(int(intMin),int(intMax))
```

- Set **random_val =** to the function **fillRandomInt(0,100)** and click **OK**. *Note: change the numbers 0 and 100 to change the range of random numbers calculated. The calculated values will be integers and will not have decimals.*



3. Calculate Random Numbers 0.0 - 1.0

- Open the attribute table for the **county** shapefile.
- Click on the **Table Options** icon in the top left corner of the attribute table, and select **Add Field**. In the **Name** text box, type in **random_value**. In the **Type** drop-down select **Double**. Leave the default **Precision** and **Scale** and click **OK**. *Note: the random_value field name contains too many characters and will be shortened.*
- In the **Field Calculator** select **Python** as the **Parser** and check **Show Codeblock**. In the **Pre-Logic Script Code** section type in:

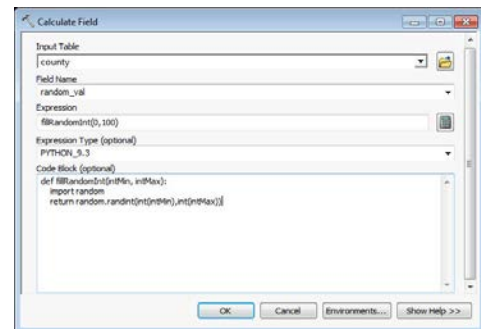
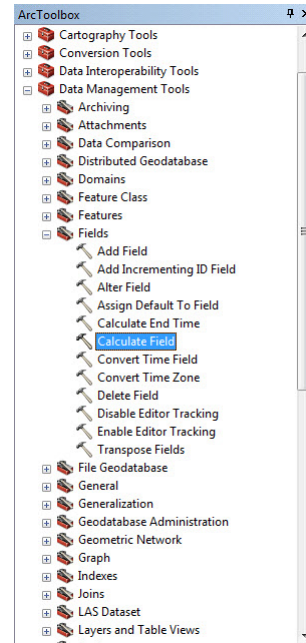


```
import numpy
def getRandomValue():
    return numpy.random.random()
```

- In the expression, set **random_val =** to the function **getRandomValue()** and click **OK**. *Note: if your field type is set to long integer or short integer, you will only see random zeros and ones. If your field type is set to float or double you will see random numbers with decimals.*

4. Calculate Random Numbers Using the Field Calculator Tool in ArcToolbox

- Open **ArcToolbox** and select **Data Management Tools > Fields > Calculate Field**.
- In the **Calculate Field** tool select **county** as the **Input Table** and **random_val** as the **Field Name**. Click on the expression calculator, the same window that you saw in **step 2d** and **step 3c** will appear.
- Fill in the code from **steps 2d** and **2c** or **steps 3c** and **3d** and Click **OK**.
- Select **PYTHON_9.3** as the **Expression Type**, and click **OK**.
- The tool will run and give you a geoprocessing result message indicating when the calculation is complete.



Contact:

Bailey Hanson bahanson@iastate.edu, 515-520-1436 or Associate Professor Christopher J. Seeger, ASLA, GISP cjseeger@iastate.edu, 515-509-0651 for more information about the Geospatial Technology Program. This task sheet and more are available at www.extension.iastate.edu/communities/gis

...and justice for all
The US Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue SW, Washington, DC 20250-9410, or call 800-795-3272 (voice) or 202-720-6382 (TDD).

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the US Department of Agriculture. Cathann Kress, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.