iemisc: Engineering Survey Examples

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Contents

Replicate the R code

Note: If you wish to replicate the R code below, then you will need to copy and paste the following commands in R first (to make sure you have the package and its dependencies):

```r
install.packages("iemisc")
# install the package and its dependencies


# load the required package
library("iemisc")
```

Midpoint

Examples

```
Northing_begin <- 283715.8495
Easting_begin <- 1292428.3999

Northing_end <- 303340.6977
Easting_end <- 1295973.7743

project_midpoint(Northing_begin, Easting_begin, Northing_end, Easting_end, units = "survey_ft",
    location = "TN", output = "advanced")
```

```
##                                                      Parameters
## 1:      Begin Project (X = East, Y = North) [US survey foot]
## 2:        End Project (X = East, Y = North) [US survey foot]
## 3: Begin Project (X = East, Y = North) [international foot]
## 4:   End Project (X = East, Y = North) [international foot]
## 5:             Begin Project (X = East, Y = North) [meters]
## 6:               End Project (X = East, Y = North) [meters]
## 7:              Begin Project Degrees (Latitude, Longitude)
## 8:           Midpoint Project Degrees (Latitude, Longitude)
## 9:                End Project Degrees (Latitude, Longitude)
##                                                          Value
## 1: Tennessee 4100 1292428.3999, 283715.8495
## 2: Tennessee 4100 1295973.7743, 303340.6977
## 3: Tennessee 4100 1292430.9848, 283716.4169
## 4: Tennessee 4100 1295976.3663, 303341.3044
## 5:    Tennessee 4100 393932.9642, 86476.7639
## 6:    Tennessee 4100 395013.5964, 92458.4296
## 7:                            35.0913, -88.2600
## 8:                            35.1184, -88.2548
## 9:                            35.1454, -88.2496
# Tennessee (TN) Northing and Easting in meters

Northing2 <- c(232489.48, 234732.431)

Easting2 <- c(942754.124, 903795.239)

dt4A <- project_midpoint(Northing2[1], Easting2[1], Northing2[2], Easting2[2], "meters",
    "TN", output = "advanced")
dt4A
```

```
##                                                      Parameters
## 1:      Begin Project (X = East, Y = North) [US survey foot]
## 2:        End Project (X = East, Y = North) [US survey foot]
## 3: Begin Project (X = East, Y = North) [international foot]
## 4:   End Project (X = East, Y = North) [international foot]
## 5:             Begin Project (X = East, Y = North) [meters]
## 6:               End Project (X = East, Y = North) [meters]
## 7:              Begin Project Degrees (Latitude, Longitude)
## 8:           Midpoint Project Degrees (Latitude, Longitude)
## 9:                End Project Degrees (Latitude, Longitude)
```

```
##                               Value
## 1: Tennessee 4100 3093019.1552, 762759.2356
## 2: Tennessee 4100 2965201.5466, 770117.9840
## 3: Tennessee 4100 3093025.3412, 762760.7612
## 4: Tennessee 4100 2965207.4770, 770119.5243
## 5:  Tennessee 4100 942754.1240, 232489.4800
## 6:  Tennessee 4100 903795.2390, 234732.4310
## 7:                        36.3685, -82.1797
## 8:                        36.3852, -82.3961
## 9:                        36.4016, -82.6127
```

Engineering Survey 1 (engr_survey)

Example 1

```
# Tennessee (TN) Northing and Easting in US Survey foot
Northing3 <- c("630817.6396", "502170.6065", "562,312.2349", "574,370.7178")

Easting3 <- c("2559599.9201", "1433851.6509", "1,843,018.4099", "1,854,896.0041")

dt3A <- engr_survey(Northing3[1], Easting3[1], "survey_ft", "TN", output = "basic",
    utm = 1)
dt3A  # first set of Northing, Easting points

## $data_check
##            X        Y
## 1: -84.00029 36.04973
##
## $utm
##    id UTM Zone UTM X = East [US survey foot] UTM Y = North [US survey foot]
## 1:  1      16S                       2526981                      13102431
##    Hemisphere
## 1:      North

dt3B <- engr_survey(Northing3[2], Easting3[2], "survey_ft", "TN", output = "basic",
    utm = 0)
dt3B  # second set of Northing, Easting points

##            X        Y
## 1: -87.80077 35.69939

dt3C <- engr_survey(Northing3[3], Easting3[3], "survey_ft", "TN", output = "basic",
    utm = 1)
dt3C  # third set of Northing, Easting points

## $data_check
##            X        Y
## 1: -86.42356 35.87738
##
## $utm
```

```
##    id UTM Zone UTM X = East [US survey foot] UTM Y = North [US survey foot]
## 1:  1      16S                    1811130                      13026554
##    Hemisphere
## 1:     North
```

```r
dt3D <- engr_survey(Northing3[4], Easting3[4], "survey_ft", "TN", output = "basic",
    utm = 0)
dt3D  # fourth set of Northing, Easting points
```

```
##            X        Y
## 1: -86.38363 35.91064
```

Example 2

```r
# Tennessee (TN) Northing and Easting in meters

Northing4 <- c(232489.48, 234732.431)

Easting4 <- c(942754.124, 903795.239)

dt4A <- engr_survey(Northing4[1], Easting4[1], "meters", "TN", output = "table",
    utm = 0)
dt4A
```

```
##                                                  Parameters
## 1:                        Degrees (Latitude, Longitude)
## 2:                 Degrees Minutes (Latitude, Longitude)
## 3:         Degrees Minutes Seconds (Latitude, Longitude)
## 4:             State Plane (X = East, Y = North) [meters]
## 5:    State Plane (X = East, Y = North) [US survey foot]
## 6: State Plane (X = East, Y = North) [international foot]
##                               Value
## 1:               36.36846, -82.17969
## 2:          36 22.10732, -82 10.78127
## 3:       36 22 6.43922, -82 10 46.87677
## 4:  Tennessee 4100 942754.12, 232489.48
## 5: Tennessee 4100 3093019.16, 762759.24
## 6: Tennessee 4100 3093025.34, 762760.76
```

```r
dt4B <- engr_survey(Northing4[2], Easting4[2], "meters", "TN", output = "table",
    utm = 0)
dt4B
```

```
##                                                   Parameters
## 1:                         Degrees (Latitude, Longitude)
## 2:                  Degrees Minutes (Latitude, Longitude)
## 3:          Degrees Minutes Seconds (Latitude, Longitude)
## 4:              State Plane (X = East, Y = North) [meters]
## 5:     State Plane (X = East, Y = North) [US survey foot]
## 6: State Plane (X = East, Y = North) [international foot]
##                               Value
## 1:               36.40158, -82.61269
## 2:          36 24.09480, -82 36.76122
```

```
## 3:            36 24 5.68834, -82 36 45.67356
## 4:   Tennessee 4100 903795.239, 234732.431
## 5: Tennessee 4100 2965201.547, 770117.984
## 6: Tennessee 4100 2965207.477, 770119.524
```

Engineering Survey 1 Batch Mode (engr_survey_batch)

Examples

```
# Tennessee (TN) Northing and Easting in meters

Northing2 <- c(232489.48, 234732.431)

Easting2 <- c(942754.124, 903795.239)

dt4 <- engr_survey_batch(Northing2, Easting2, "meters", "TN", output = "table")
dt4

##                                         Parameters
##  1:                 Degrees (Latitude, Longitude)
##  2:           Degrees Minutes (Latitude, Longitude)
##  3:      Degrees Minutes Seconds (Latitude, Longitude)
##  4:        State Plane (X = East, Y = North) [meters]
##  5:    State Plane (X = East, Y = North) [US survey foot]
##  6: State Plane (X = East, Y = North) [international foot]
##  7:                 Degrees (Latitude, Longitude)
##  8:           Degrees Minutes (Latitude, Longitude)
##  9:      Degrees Minutes Seconds (Latitude, Longitude)
## 10:        State Plane (X = East, Y = North) [meters]
## 11:    State Plane (X = East, Y = North) [US survey foot]
## 12: State Plane (X = East, Y = North) [international foot]
##                                              Value
##  1:                   36.36845, -82.17968
##  2:              36 22.10732, -82 10.78127
##  3:          36 22 6.43922, -82 10 46.87677
##  4:     Tennessee 4100 942754.12, 232489.48
##  5:    Tennessee 4100 3093019.14, 762759.24
##  6:    Tennessee 4100 3093025.33, 762760.76
##  7:                   36.40158, -82.61268
##  8:              36 24.09480, -82 36.76122
##  9:          36 24 5.68834, -82 36 45.67356
## 10:   Tennessee 4100 903795.239, 234732.431
## 11: Tennessee 4100 2965201.547, 770117.984
## 12: Tennessee 4100 2965207.477, 770119.524
```

Engineering Survey 2 (engr_survey2)

Examples

```
station5 <- "516+64.10"
station6 <- "511+29.10"

engr_survey2(station5, station6, units1 = "foot", units2 = "kilometers")

## 0.163068 [km]
station7 <- "303+91.00"
station8 <- "299+41.00"

engr_survey2(station7, station8, units1 = "meters", units2 = "foot")

## 450 [ft]
station9 <- "43+50.00"
station10 <- "52+00.00"

engr_survey2(station9, station10, units1 = "foot", units2 = "mile")

## 0.1609848 [international_mile]
```

Engineering Survey 3 (engr_survey3)

Example

```
engr_survey3(23, station_distance = 100, units = "survey_mile", output = "numeric")

## [1] 1214.402
```

Engineering Survey 4 (engr_survey4)

Example

```
engr_survey4(1394.32, "45+43.12", units = "kilometers")

## [1] "Sta. 50288+52.68"
```

Conversion of Latitude/Longitude Coordinates to Engineering Survey Measurements (engr_survey_reverse)

```
# Tennessee

lat <- 35.8466965

long <- -88.9206794

dt1A <- engr_survey_reverse(lat, long, units = "survey_ft", location = "TN", output = "table",
    utm = 0)
dt1A
```

```
##                                               Parameters
## 1:                          Degrees (Latitude, Longitude)
## 2:                  Degrees Minutes (Latitude, Longitude)
## 3:          Degrees Minutes Seconds (Latitude, Longitude)
## 4:              State Plane (X = East, Y = North) [meters]
## 5:      State Plane (X = East, Y = North) [US survey foot]
## 6: State Plane (X = East, Y = North) [international foot]
##                                               Value
## 1:                          35.8467, -88.92068
## 2:                     35 50.80178, -88 55.24076
## 3:              35 50 48.10739, -88 55 14.44584
## 4:   Tennessee 4100 336204.8118, 171842.6309
## 5: Tennessee 4100 1103031.9533, 563787.0316
## 6: Tennessee 4100 1103034.1594, 563788.1592
```

```
# Kentucky

lats <- "37'50'21.5988''N"
longs <- "84'16'12.0720'W"

dt2B <- engr_survey_reverse(lats, longs, "foot", "KY", output = "table", utm = 0)
dt2B
```

```
##                                               Parameters
## 1:                          Degrees (Latitude, Longitude)
## 2:                  Degrees Minutes (Latitude, Longitude)
## 3:          Degrees Minutes Seconds (Latitude, Longitude)
## 4:              State Plane (X = East, Y = North) [meters]
## 5:      State Plane (X = East, Y = North) [US survey foot]
## 6: State Plane (X = East, Y = North) [international foot]
##                                                    Value
## 1:                               37.83933, -84.27002
## 2:                          37 50.35998, -84 16.20119
## 3:                   37 50 21.59880, -84 16 12.07199
## 4: Kentucky (Single Zone) 1600 1630255.5592, 1168172.2563
## 5: Kentucky (Single Zone) 1600 5348596.7804, 3832578.4776
## 6: Kentucky (Single Zone) 1600 5348607.4776, 3832586.1427
```

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