Create Model Coefficients

- **Daylight Hours**
  - Load CD_Daylight.csv as dictionary
  - Average over climate divisions
  - Organize by week

Daylight hours of illinois climate divisions by week

```
{'1': {'HRS_DYLT_DIV1': '9.228', 'HRS_DYLT_DIV2': '9.228', 'HRS_DYLT_DIV3': '9.367',
'HRS_DYLT_DIV4': '9.367', 'HRS_DYLT_DIV5': '9.350', 'HRS_DYLT_DIV6': '9.467', 'HRS_DYLT_DIV7':
'9.489', 'HRS_DYLT_DIV8': '9.600', 'HRS_DYLT_DIV9': '9.600', 'WEEK': '1', 'average':
9.410666666666664}, '10': {'HRS_DYLT_DIV1': '11.400', ...
```

  - wrong to use average for daylight, use daylight for geographic region
  - Do these weeks match with cdc_week old or new?
- **Weather Data - Create weather dictionary for geographic region - structured calendar year/month/day**
  - load 110x
  - run node function for getting epi week/year from date: https://www.npmjs.com/package/epidemiological-week
  - convert Fahrenheit to Celsius
  - convert inches to cm
  - calculate average of temp max and min
  - Organize by year/month/day

Weather Dictionary Year/Month/Day

```
 '2016': {'1': {'1': {'cdc_week': {u'dow': 5, u'week': 52, u'year': 2015},
                     'climate_div': '9',
                     'precip': 0.0,
                     'state': 'IL',
                     'temp_avg': -0.7500000000000008,
                     'temp_max': 1.2777777777777761,
                     'temp_min': -2.7777777777777777},
                '10': {'cdc_week': {u'dow': 0, u'week': 2, u'year': 2016},
                       'climate_div': '9',
                       'precip': 2.2098,
                       'state': 'IL',
                       'temp_avg': -0.833333333333333,
                       'temp_max': 8.88888888888889,
                       'temp_min': -10.555555555555555},
...
```

- **Weather Data - Create weather dictionary for geographic region - structured EPI year/week**
-
- **30 Year Normals**
  - same thing, not averages of climate divs, but use data for geographic region
  - sum both precip and temp and divide by number of rows
  - For each week calculate normal, not for all weeks total

```
Temp 30 year total:  123310.944444
Temp 30 year normal 11.2540790768
Precip 30 year total:  2821.6098
Precip 30 year normal 0.257516637766
```

-
  -
  -
  - *Create degree/precip week dictionary for a single climate division*
    - Loop through years and weeks
      - degree week = (Sum(daily averages)/7 -22) + last weeks degree
      - get list of dates for week from database

- average week's temps: (Sum(daily averages)/7 -22)
  - start creating data for first week > 0
    - need to include zero weeks
  - sum weekly averages
    - if <0, add zero, else: add next week
  - abnormal week (difference) (df) = degree week - 30 year normal (for geographic region)
  - precipitation is total not average like degree week


```
{2015: {21: {'degree_week': -10.567571140287205,
             'degree_week_total_year': -10.567571140287205,
             'temp': 0.6865079365079367,
             'temps_total_year': 0.6865079365079367},
        22: {'degree_week': -14.67471399743006,
             'degree_week_total_year': -25.242285137717268,
             'temp': -3.42063492063492,
             'temps_total_year': -2.7341269841269833},
        23: {'degree_week': -7.70249177520784,
             'degree_week_total_year': -32.94477691292511,
             'temp': 3.5515873015873014,
             'temps_total_year': 0.8174603174603181},
        24: {'degree_week': -7.555666378382444,
             'degree_week_total_year': -40.50044329130755,
             'temp': 3.6984126984126973,
             'temps_total_year': 4.515873015873016},
        25: {'degree_week': -7.678682251398316,
             'degree_week_total_year': -48.17912554270586,
             'temp': 3.575396825396826,
             'temps_total_year': 8.091269841269842},
        26: {'degree_week': -10.428682251398318,
             'degree_week_total_year': -58.607807794104176,
             'temp': 0.825396825396825,
             'temps_total_year': 8.916666666666666},
        27: {'degree_week': -9.980269552985616,
             'degree_week_total_year': -68.5880773470898,
             'temp': 1.273809523809525,
             'temps_total_year': 10.190476190476192},
        28: {'degree_week': -6.135031457747523,
             'degree_week_total_year': -74.72310880483732,
             'temp': 5.119047619047619,
             'temps_total_year': 15.30952380952381},
        29: {'degree_week': -7.658840981557047,
             'degree_week_total_year': -82.38194978639437,
             'temp': 3.5952380952380953,
             'temps_total_year': 18.904761904761905},
        30: {'degree_week': -6.849317172033236,
             'degree_week_total_year': -89.23126695842761,
             'temp': 4.404761904761906,
             'temps_total_year': 23.30952380952381},
        31: {'degree_week': -8.615190187906252,
             'degree_week_total_year': -97.84645714633386,
             'temp': 2.638888888888889,
             'temps_total_year': 25.9484126984127},
        32: {'degree_week': -9.341380664096729,
             'degree_week_total_year': -107.1878378104306,
             'temp': 1.9126984126984123,
             'temps_total_year': 27.86111111111111},
        33: {'degree_week': -10.369158441874506,
             'degree_week_total_year': -117.5569962523051,
             'temp': 0.8849206349206362,
             'temps_total_year': 28.746031746031747},
        34: {'degree_week': -13.337412410128476,
             'degree_week_total_year': -130.89440866243356,
             'temp': -2.0833333333333335,
             'temps_total_year': 26.662698412698415},
        35: {'degree_week': -8.05169812441419,
             'degree_week_total_year': -138.94610678684776,
             'temp': 3.2023809523809526,
             'temps_total_year': 29.865079365079367},
        36: {'degree_week': -9.24217431489038,
```

```
     'degree_week_total_year': -148.18828110173814,
     'temp': 2.011904761904762,
     'temps_total_year': 31.87698412698413},
37: {'degree_week': -13.96042828314435,
     'degree_week_total_year': -162.1487093848825,
     'temp': -2.7063492063492065,
     'temps_total_year': 29.170634920634924},
38: {'degree_week': -13.881063203779268,
     'degree_week_total_year': -176.02977258866176,
     'temp': -2.626984126984127,
     'temps_total_year': 26.543650793650798},
39: {'degree_week': -14.82153939425546,
     'degree_week_total_year': -190.85131198291722,
     'temp': -3.567460317460317,
     'temps_total_year': 22.97619047619048},
40: {'degree_week': -15.99217431489038,
     'degree_week_total_year': -206.8434862978076,
     'temp': -4.738095238095239,
     'temps_total_year': 18.23809523809524},
41: {'degree_week': -18.82153939425546,
     'degree_week_total_year': -225.66502569206307,
     'temp': -7.567460317460316,
     'temps_total_year': 10.670634920634924},
42: {'degree_week': -19.385031457747523,
     'degree_week_total_year': -245.05005714981058,
     'temp': -8.130952380952381,
     'temps_total_year': 2.539682539682543},
43: {'degree_week': -21.254079076795144,
     'degree_week_total_year': -266.30413622660575,
     'temp': -10.0,
     'temps_total_year': -7.460317460317457},
44: {'degree_week': -18.58344415616022,
     'degree_week_total_year': -284.887580382766,
     'temp': -7.329365079365078,
     'temps_total_year': -14.789682539682534},
45: {'degree_week': -24.666777489493555,
     'degree_week_total_year': -309.5543578722595,
     'temp': -13.412698412698413,
     'temps_total_year': -28.20238095238095},
46: {'degree_week': -23.146936219652282,
     'degree_week_total_year': -332.7012940919118,
     'temp': -11.892857142857142,
     'temps_total_year': -40.09523809523809},
47: {'degree_week': -25.964396537112602,
     'degree_week_total_year': -358.66569062902437,
     'temp': -14.71031746031746,
     'temps_total_year': -54.80555555555555},
48: {'degree_week': -29.027888600604662,
     'degree_week_total_year': -387.69357922962905,
     'temp': -17.773809523809522,
     'temps_total_year': -72.57936507936508},
49: {'degree_week': -24.682650505366567,
     'degree_week_total_year': -412.3762297349956,
     'temp': -13.428571428571427,
     'temps_total_year': -86.0079365079365},
50: {'degree_week': -24.71836479108085,
     'degree_week_total_year': -437.09459452607643,
     'temp': -13.464285714285712,
     'temps_total_year': -99.47222222222221},
51: {'degree_week': -24.68265050536657,
     'degree_week_total_year': -461.777245031443,
     'temp': -13.428571428571429,
     'temps_total_year': -112.90079365079364},
52: {'degree_week': -28.325507648223713,
     'degree_week_total_year': -490.1027526796667,
     'temp': -17.071428571428573,
     'temps_total_year': -129.97222222222223},
53: {'degree_week': -11.254079076795142,
     'degree_week_total_year': -501.3568317564619,
     'temp': 0,
```

        - Create degree/precip season dictioanary
            - loop through season weeks
                - average weeks 13 weeks of each of 5 seasons
- **Build File**
- **Create cdc week database**
    - rules
        - first day is sunday
        - first week of year has at least 4 days in week
            - if january 1 on sunday-wednesday, first week starts on this week
            - if january 1 on thursday-saturday, first week start in previous year