```
In [42]:   # Dependencies and Setup
           import pandas as pd
           import numpy as np
           import requests
           import json
           import matplotlib.pyplot as plt


           # Import API key
           from api_keys import api_key

           # Incorporated citipy to determine city based on latitude and longitude
           from citipy import citipy

           # Output File (CSV)
           output_data_file = "output_data/cities.csv"

           # Range of latitudes and longitudes
           lat_range = (-90, 90)
           lng_range = (-180, 180)
```

Generate Cities List

```
In [43]:   # List for holding lat_lngs and cities
           lat_lngs = []
           cities = []
           city_count=0
           # Create a set of random lat and lng combinations
           lats = np.random.uniform(low=-90.000, high=90.000, size=1500)
           lngs = np.random.uniform(low=-180.000, high=180.000, size=1500)
           lat_lngs = zip(lats, lngs)

           # Identify nearest city for each lat, lng combination
           for lat_lng in lat_lngs:
               city = citipy.nearest_city(lat_lng[0], lat_lng[1]).city_name

               # If the city is unique, then add it to a our cities list
               if city not in cities:
                   cities.append(city)
                   city_count+=1
           # Print the city count to confirm sufficient count
           print(f"total {city_count} cities")
```

```
total 607 cities
```

Perform API Calls

```
In [44]: # OpenWeatherMap API Key
         data=[]
         city_no=0
         for city in cities:
             url ="http://api.openweathermap.org/data/2.5/weather?appid="+api_key
         +"&units=Imperial" +"&q="+ city
             response = requests.get(url).json()

             try:
                 city_no+=1
                 print(f"city no {city_no},{city}")
                 res = {
                     'lat': response['coord']['lat'],
                     'temp': response['main']['temp'],
                     'humidity': response['main']['humidity'],
                     'cloudiness': response['clouds']['all'],
                     'wind_speed': response['wind']['speed']
                 }
                 data.append(res)
             except Exception:
                 print(f"city {city} not found")
```

```
city no 1,taolanaro
city taolanaro not found
city no 2,qaanaaq
city no 3,victoria
city no 4,birjand
city no 5,kearney
city no 6,kaeo
city no 7,illoqqortoormiut
city illoqqortoormiut not found
city no 8,linjiang
city no 9,provideniya
city no 10,salalah
city no 11,ushuaia
city no 12,olafsvik
city olafsvik not found
city no 13,vaini
city no 14,sarana
city no 15,butaritari
city no 16,dikson
city no 17,barentsburg
city barentsburg not found
city no 18,rio gallegos
city no 19,vila franca do campo
city no 20,quelimane
city no 21,rikitea
city no 22,tuktoyaktuk
city no 23,kabelvag
city no 24,fenoarivo
city no 25,price
city no 26,cidreira
city no 27,yellowknife
city no 28,san policarpo
city no 29,faya
city no 30,nanortalik
city no 31,mar del plata
city no 32,yulara
city no 33,poso
city no 34,ribeira grande
city no 35,ponta do sol
city no 36,buala
city no 37,caucaia
city no 38,busselton
city no 39,hambantota
city no 40,puerto ayora
city no 41,albany
city no 42,mauganj
city no 43,atuona
city no 44,kapaa
city no 45,lincoln
city no 46,sitka
city no 47,inyonga
city no 48,saint-pierre
city no 49,fort saint john
city fort saint john not found
city no 50,port elizabeth
city no 51,tura
city no 52,namibe
```

```
        city no 53,buchanan
        city no 54,san patricio
        city no 55,bredasdorp
        city no 56,bluff
        city no 57,suez
        city no 58,espanola
        city no 59,petropavlovsk-kamchatskiy
        city no 60,attawapiskat
        city attawapiskat not found
        city no 61,sarkand
        city no 62,hualmay
        city no 63,caala
        city no 64,tasiilaq
        city no 65,boden
        city no 66,ambilobe
        city no 67,hobart
        city no 68,renqiu
        city no 69,am timan
        city no 70,bireun
        city no 71,kruisfontein
        city no 72,ancud
        city no 73,beira
        city no 74,yei
        city yei not found
        city no 75,barrow
        city no 76,broome
        city no 77,codrington
        city no 78,nikolskoye
        city no 79,riyadh
        city no 80,hermanus
        city no 81,karamay
        city karamay not found
        city no 82,sadiqabad
        city no 83,east london
        city no 84,severo-kurilsk
        city no 85,antofagasta
        city no 86,saint anthony
        city no 87,torbay
        city no 88,cumra
        city no 89,cabra
        city no 90,baykit
        city no 91,cape town
        city no 92,lima
        city no 93,katsuura
        city no 94,chuy
        city no 95,hilo
        city no 96,port alfred
        city no 97,nicoya
        city no 98,georgetown
        city no 99,khatanga
        city no 100,port-gentil
        city no 101,vestbygda
        city vestbygda not found
        city no 102,qeshm
        city no 103,new norfolk
        city no 104,saskylakh
        city no 105,salekhard
```

```
city no 106,panaba
city no 107,kachiry
city no 108,punta arenas
city no 109,griffith
city no 110,la ronge
city no 111,geraldton
city no 112,kiunga
city no 113,esperance
city no 114,nalut
city no 115,bambous virieux
city no 116,grand river south east
city grand river south east not found
city no 117,belmonte
city no 118,abu dhabi
city no 119,leningradskiy
city no 120,noumea
city no 121,zaltan
city no 122,ribeira brava
city no 123,malur
city no 124,carnarvon
city no 125,gull lake
city no 126,thompson
city no 127,grindavik
city no 128,mataura
city no 129,talara
city no 130,banfora
city no 131,bagamer
city no 132,ostrovnoy
city no 133,kodiak
city no 134,broken hill
city no 135,pangoa
city no 136,bengkulu
city bengkulu not found
city no 137,mattru
city no 138,qui nhon
city qui nhon not found
city no 139,fortuna
city no 140,oussouye
city no 141,bay roberts
city no 142,pochutla
city no 143,kokopo
city no 144,molteno
city no 145,dongsheng
city no 146,tobane
city no 147,staraya toropa
city no 148,samarai
city no 149,norman wells
city no 150,kathu
city no 151,malartic
city no 152,emerald
city no 153,narsaq
city no 154,mwinilunga
city no 155,casa nova
city no 156,yanam
city no 157,nizhneyansk
city nizhneyansk not found
city no 158,mankono
```

```
           city no 159,potzu
           city potzu not found
           city no 160,castro
           city no 161,gonbad-e qabus
           city no 162,riverton
           city no 163,acapulco
           city no 164,coquimbo
           city no 165,batticaloa
           city no 166,zhanaozen
           city no 167,margate
           city no 168,okrika
           city no 169,kaitangata
           city no 170,tabiauea
           city tabiauea not found
           city no 171,playa vicente
           city no 172,iqaluit
           city no 173,belushya guba
           city belushya guba not found
           city no 174,laguna
           city no 175,ocampo
           city no 176,elat
           city no 177,sai buri
           city no 178,tikhvin
           city no 179,high level
           city no 180,amderma
           city amderma not found
           city no 181,adrian
           city no 182,los llanos de aridane
           city no 183,qaqortoq
           city no 184,jacareacanga
           city no 185,port keats
           city no 186,havre-saint-pierre
           city no 187,sardarshahr
           city no 188,soddy-daisy
           city no 189,manaus
           city no 190,clyde river
           city no 191,tyristrand
           city no 192,lufilufi
           city no 193,raahe
           city no 194,yerbogachen
           city no 195,half moon bay
           city no 196,pevek
           city no 197,touros
           city no 198,tharad
           city no 199,kahului
           city no 200,stephenville
           city no 201,ust-tsilma
           city no 202,bilibino
           city no 203,souillac
           city no 204,belle fourche
           city no 205,avarua
           city no 206,valleyview
           city no 207,boguchany
           city no 208,khasan
           city no 209,isangel
           city no 210,puerto penasco
           city no 211,bagotville
```

```
city no 212,dickinson
city no 213,bethel
city no 214,marrakesh
city no 215,magdalena
city no 216,kuching
city no 217,karauzyak
city karauzyak not found
city no 218,arraial do cabo
city no 219,kulhudhuffushi
city no 220,letterkenny
city no 221,douentza
city no 222,saint-philippe
city no 223,kragujevac
city no 224,flinders
city no 225,walvis bay
city no 226,anamur
city no 227,auki
city no 228,karratha
city no 229,port hedland
city no 230,ardakan
city no 231,chagda
city chagda not found
city no 232,aleksandrov gay
city no 233,vrangel
city no 234,novyy oskol
city no 235,ahipara
city no 236,waldshut-tiengen
city no 237,tiksi
city no 238,sinnamary
city no 239,van
city no 240,mahadday weyne
city mahadday weyne not found
city no 241,sao filipe
city no 242,ijaki
city ijaki not found
city no 243,saint george
city no 244,sao felipe
city sao felipe not found
city no 245,ler
city no 246,port lincoln
city no 247,viedma
city no 248,lebu
city no 249,nouakchott
city no 250,elizabeth city
city no 251,cherskiy
city no 252,nioro
city no 253,san jose
city no 254,ngukurr
city ngukurr not found
city no 255,batagay-alyta
city no 256,lardos
city no 257,hounde
city no 258,mahebourg
city no 259,akcakoca
city no 260,pascagoula
city no 261,sentyabrskiy
city sentyabrskiy not found
```

```
city no 262,lethem
city no 263,tuatapere
city no 264,kenai
city no 265,west wendover
city no 266,san carlos de bariloche
city no 267,lata
city no 268,mayumba
city no 269,harper
city no 270,mount isa
city no 271,lompoc
city no 272,hithadhoo
city no 273,vozhega
city no 274,varhaug
city no 275,medicine hat
city no 276,pau dos ferros
city no 277,kralendijk
city no 278,praia
city no 279,nishihara
city no 280,port macquarie
city no 281,necochea
city no 282,yamasaki
city no 283,sabha
city no 284,thanh hoa
city no 285,roma
city no 286,vila velha
city no 287,kirovsk
city no 288,tautira
city no 289,zhigansk
city no 290,odweyne
city odweyne not found
city no 291,louisbourg
city louisbourg not found
city no 292,napoleon
city no 293,hami
city no 294,san cristobal
city no 295,vytegra
city no 296,hasaki
city no 297,bathsheba
city no 298,kysyl-syr
city no 299,pacific grove
city no 300,nelson bay
city no 301,klaksvik
city no 302,samusu
city samusu not found
city no 303,jamestown
city no 304,champerico
city no 305,teluknaga
city no 306,anju
city no 307,tilichiki
city no 308,tumannyy
city tumannyy not found
city no 309,puerto carreno
city no 310,harnosand
city no 311,biltine
city no 312,chisinau
city no 313,pasighat
city no 314,wa
```

```
city wa not found
city no 315,constitucion
city no 316,gat
city no 317,matara
city no 318,jardim
city no 319,portland
city no 320,chipinge
city no 321,tucurui
city no 322,chokurdakh
city no 323,vanimo
city no 324,mys shmidta
city mys shmidta not found
city no 325,shumikha
city no 326,beba
city no 327,scottsburgh
city scottsburgh not found
city no 328,lacombe
city no 329,kazalinsk
city kazalinsk not found
city no 330,rabat
city no 331,pedra azul
city no 332,inuvik
city no 333,antalaha
city no 334,ayan
city no 335,cairns
city no 336,anori
city no 337,anchorage
city no 338,cayenne
city no 339,chirongui
city no 340,longyearbyen
city no 341,tongliao
city no 342,erenhot
city no 343,solvychegodsk
city no 344,boyolangu
city no 345,marovoay
city no 346,elko
city no 347,kinkala
city no 348,bacuit
city bacuit not found
city no 349,sur
city no 350,lacaron
city no 351,muzhi
city no 352,marcona
city marcona not found
city no 353,moron
city no 354,brokopondo
city no 355,jumla
city no 356,san pedro de macoris
city no 357,korla
city korla not found
city no 358,ilhabela
city no 359,udayagiri
city no 360,alcudia
city no 361,alta floresta
city no 362,topolobampo
city no 363,nizwa
city no 364,araouane
```

```
city no 365,manta
city no 366,beringovskiy
city no 367,marzuq
city no 368,lingao
city no 369,faro
city no 370,tosya
city no 371,padang
city no 372,rexburg
city no 373,faanui
city no 374,trelew
city no 375,bauchi
city no 376,uray
city no 377,guerrero negro
city no 378,rudnichnyy
city no 379,dunedin
city no 380,port moresby
city no 381,bongandanga
city no 382,meyungs
city meyungs not found
city no 383,marawi
city no 384,pemba
city no 385,port lavaca
city no 386,hashtrud
city no 387,upernavik
city no 388,diu
city no 389,meulaboh
city no 390,cerfontaine
city no 391,talnakh
city no 392,avera
city no 393,komsomolskiy
city no 394,kongolo
city no 395,airai
city no 396,muscat
city no 397,labuhan
city no 398,karla
city no 399,khor
city no 400,morros
city no 401,mareeba
city no 402,mayo
city no 403,port hardy
city no 404,prado
city no 405,lavrentiya
city no 406,nome
city no 407,vao
city no 408,tshikapa
city no 409,dolgoderevenskoye
city no 410,kuvshinovo
city no 411,sturgeon bay
city no 412,abonnema
city no 413,sao joao da barra
city no 414,manado
city no 415,pangai
city no 416,cozumel
city cozumel not found
city no 417,haldibari
city no 418,hit
city no 419,aklavik
```

```
city no 420,hirara
city no 421,puerto el triunfo
city no 422,homer
city no 423,kano
city no 424,sterling
city no 425,yatou
city no 426,stornoway
city stornoway not found
city no 427,sturgis
city no 428,karasjok
city no 429,fairbanks
city no 430,itaituba
city no 431,karmana
city karmana not found
city no 432,fort nelson
city no 433,dryden
city no 434,bonthe
city no 435,plettenberg bay
city no 436,port hueneme
city no 437,ames
city no 438,ravar
city no 439,kanel
city no 440,abha
city no 441,anadyr
city no 442,leshukonskoye
city no 443,kavaratti
city no 444,atar
city no 445,ciudad bolivar
city no 446,vaitupu
city vaitupu not found
city no 447,ichinohe
city no 448,muncar
city no 449,palabuhanratu
city palabuhanratu not found
city no 450,berdigestyakh
city no 451,moville
city no 452,mahon
city no 453,caravelas
city no 454,mogzon
city no 455,luderitz
city no 456,dingle
city no 457,umzimvubu
city umzimvubu not found
city no 458,paracuru
city no 459,acari
city no 460,palmer
city no 461,vieques
city no 462,pionerskiy
city no 463,tateyama
city no 464,grootegast
city no 465,miri
city no 466,ternate
city no 467,daxian
city daxian not found
city no 468,darhan
city no 469,sept-iles
city no 470,olavarria
```

```
city no 471,cabo san lucas
city no 472,sayabec
city sayabec not found
city no 473,husavik
city no 474,kununurra
city no 475,shache
city no 476,blackwater
city no 477,pastavy
city no 478,bolungarvik
city bolungarvik not found
city no 479,wilmington
city no 480,sibolga
city no 481,itarema
city no 482,miramar
city no 483,kavieng
city no 484,bambanglipuro
city no 485,ostersund
city no 486,kukmor
city no 487,shkotovo-22
city shkotovo-22 not found
city no 488,paka
city no 489,barreirinhas
city no 490,garowe
city no 491,kargasok
city no 492,coihaique
city no 493,tupanatinga
city no 494,escanaba
city no 495,zyryanka
city no 496,tubuala
city no 497,tsihombe
city tsihombe not found
city no 498,maryville
city no 499,naze
city no 500,sokoni
city no 501,bilma
city no 502,turukhansk
city no 503,luba
city no 504,benguela
city no 505,gambiran
city no 506,kirakira
city no 507,namwala
city no 508,yar-sale
city no 509,merauke
city no 510,mirnyy
city no 511,saleaula
city saleaula not found
city no 512,wanning
city no 513,ust-maya
city no 514,menongue
city no 515,lorengau
city no 516,karistos
city karistos not found
city no 517,katsiveli
city katsiveli not found
city no 518,blagoveshchenka
city no 519,pitimbu
city no 520,batesville
```

```
city no 521,pisco
city no 522,mezen
city no 523,muros
city no 524,rorvik
city no 525,san rafael
city no 526,acara
city acara not found
city no 527,sol-iletsk
city no 528,sakakah
city sakakah not found
city no 529,karamea
city karamea not found
city no 530,san antonio del tachira
city no 531,dahra
city no 532,akyab
city akyab not found
city no 533,saldanha
city no 534,dapaong
city no 535,raha
city no 536,erzin
city no 537,makakilo city
city no 538,mount gambier
city no 539,satitoa
city satitoa not found
city no 540,tripoli
city no 541,big spring
city no 542,umm kaddadah
city no 543,buchen
city no 544,lundazi
city no 545,nanakuli
city no 546,bubaque
city no 547,chapais
city no 548,tulun
city no 549,roald
city no 550,draguignan
city no 551,ambovombe
city no 552,eskasem
city eskasem not found
city no 553,terralba
city no 554,flin flon
city no 555,derzhavinsk
city no 556,guarapari
city no 557,iquique
city no 558,lagos
city no 559,mayya
city no 560,brae
city no 561,emirdag
city no 562,ketchikan
city no 563,hovd
city no 564,catuday
city no 565,kajaani
city no 566,letnyaya stavka
city no 567,carupano
city no 568,kem
city no 569,ndjole
city no 570,niquelandia
city no 571,port augusta
```

```
city no 572,hohhot
city no 573,waounde
city no 574,sandnessjoen
city no 575,kalawit
city no 576,simpang
city no 577,bandarbeyla
city no 578,tunxi
city tunxi not found
city no 579,tashara
city no 580,lagoa
city no 581,hobyo
city no 582,acarau
city acarau not found
city no 583,uyemskiy
city no 584,beysehir
city no 585,amarillo
city no 586,yialos
city yialos not found
city no 587,dzhebariki-khaya
city no 588,ocos
city no 589,acajutla
city no 590,olden
city no 591,gritsovskiy
city no 592,pampierstad
city no 593,gizo
city no 594,vostok
city no 595,jingdezhen
city no 596,jucurutu
city no 597,taltal
city no 598,solginskiy
city no 599,panara
city no 600,thinadhoo
city no 601,ipixuna
city no 602,kazerun
city no 603,kasra
city kasra not found
city no 604,hanamaki
city no 605,gorontalo
city no 606,galapagar
city no 607,shubarshi
```

In [45]:
```
data_df=pd.DataFrame(data)
data_df.head()
```
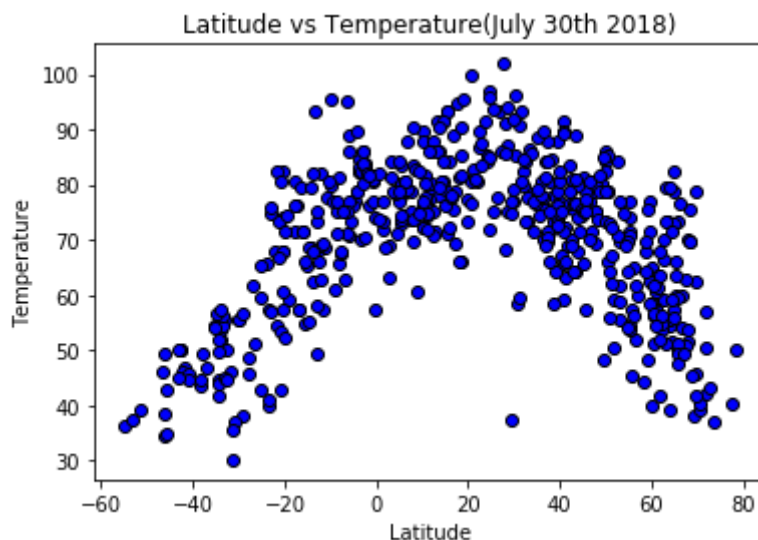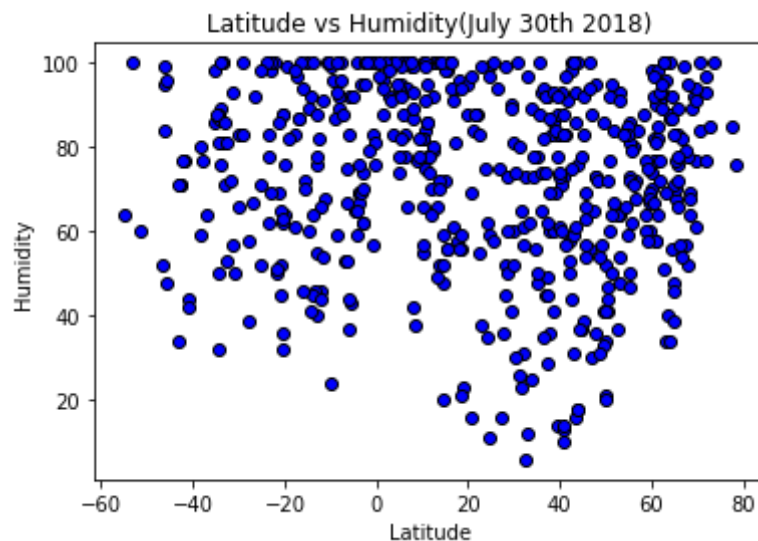
Out[45]:

	cloudiness	humidity	lat	temp	wind_speed
0	88	85	77.48	40.43	2.37
1	90	94	5.28	78.01	4.70
2	0	12	32.86	73.40	9.17
3	20	73	40.70	65.61	13.87
4	80	86	-35.10	54.56	7.29

In [46]:
```
lat=data_df["lat"]
temp=data_df["temp"]
humidity=data_df["humidity"]
wind_speed=data_df["wind_speed"]
cloudiness=data_df["cloudiness"]
```
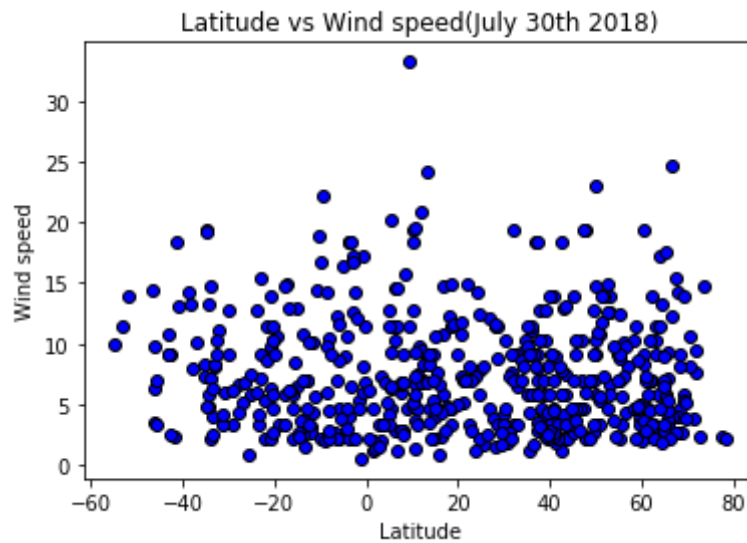
In [47]:
```
plt.scatter(lat,temp,marker="o", facecolors="blue", edgecolors="black")
plt.title("Latitude vs Temperature(July 30th 2018)")
plt.xlabel("Latitude")
plt.ylabel("Temperature")
plt.savefig("../Images/July_30_lat_vs temp.png")
```


Latitude vs Temperature(July 30th 2018)

In [48]:
```
plt.scatter(lat,humidity,marker="o", facecolors="blue", edgecolors="blac
k")
plt.title("Latitude vs Humidity(July 30th 2018)")
plt.xlabel("Latitude")
plt.ylabel("Humidity")
plt.savefig("../Images/July_30_lat_vs_humidity.png")
```


Latitude vs Humidity(July 30th 2018)

In [49]:
```python
plt.scatter(lat,wind_speed,marker="o", facecolors="blue", edgecolors="bl
ack")
plt.title("Latitude vs Wind speed(July 30th 2018)")
plt.xlabel("Latitude")
plt.ylabel("Wind speed")
plt.savefig("../Images/July_30_lat_vs_windspeed.png")
```


In [50]:
```python
plt.scatter(lat,cloudiness,marker="o", facecolors="blue", edgecolors="bl
ack")
plt.title("Latitude vs Cloudiness(July 30th 2018)")
plt.xlabel("Latitude")
plt.ylabel("Cloudiness")
plt.savefig("../Images/July_30_lat_vs_cloudiness.png")
```