In [7]:

```
import numpy as np
import pandas as pd
train_df = pd.read_csv('train.csv', nrows=1000000)
train_df.shape
```

Out[7]:

```
(1000000, 8)
```

In [8]:

```
#remove unwanted data. After multiple iterations and runs, efficient way
 to data clean

required_data = (train_df['fare_amount'].between(2.5, 200) & train_df['p
assenger_count'].between(0, 6) &
                train_df['pickup_longitude'].between(-74.5, -72.5) & tra
in_df['dropoff_longitude'].between(-74.5, -72.5) &
                train_df['pickup_latitude'].between(40, 42) & train_df[
'dropoff_latitude'].between(40, 42))
```

In [9]:

```
train_df.shape
```

Out[9]:

```
(1000000, 8)
```

In [10]:

```
train_df = train_df[required_data]
```

In [11]:

```
train_df.shape
```

Out[11]:

```
(979060, 8)
```

In [16]:

```
train_df.head()
```

Out[16]:

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21 UTC	-73.844311	40.721319
1	2010-01-05 16:52:16.0000002	16.9	2010-01-05 16:52:16 UTC	-74.016048	40.711303
2	2011-08-18 00:35:00.00000049	5.7	2011-08-18 00:35:00 UTC	-73.982738	40.761270
3	2012-04-21 04:30:42.0000001	7.7	2012-04-21 04:30:42 UTC	-73.987130	40.733143
4	2010-03-09 07:51:00.000000135	5.3	2010-03-09 07:51:00 UTC	-73.968095	40.768008

train_df['pickup_datetime'] = pd.to_datetime(train_df['pickup_datetime'])

In [18]:

```
train_df['pickup_datetime'] = pd.to_datetime(train_df['pickup_datetime'
])
```

In [19]:

```
def extractdatetime(data):
    data['hour'] = data['pickup_datetime'].dt.hour
    data['year'] = data['pickup_datetime'].dt.year
    data['month'] = data['pickup_datetime'].dt.month
    data['date'] = data['pickup_datetime'].dt.day
    data['day'] = data['pickup_datetime'].dt.dayofweek
    return data

train_df=extractdatetime(train_df)
```

In [20]:

```
train_df.head()
```

Out[20]:

e_amount	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_
	2009-06-15 17:26:21	-73.844311	40.721319	-73.841610	40.71227
9	2010-01-05 16:52:16	-74.016048	40.711303	-73.979268	40.78200
	2011-08-18 00:35:00	-73.982738	40.761270	-73.991242	40.75056
	2012-04-21 04:30:42	-73.987130	40.733143	-73.991567	40.75809
	2010-03-09 07:51:00	-73.968095	40.768008	-73.956655	40.78376

In [145]:

```
#Thanks to Stack_Overflow. Another efficient way of calculating distnce
 when co-or are given (Haversine Distance)
def distance(pickup_longitude, pickup_latitude, dropoff_longitude, dropo
ff_latitude):
    pickup_longitude, pickup_latitude, dropoff_longitude, dropoff_latitu
de = map(np.radians, [pickup_longitude,pickup_latitude,dropoff_longitude
,dropoff_latitude])
    dlong = dropoff_longitude - pickup_longitude
    dlat = dropoff_latitude - pickup_latitude
    a = np.sin(dlat/2.0)**2 + np.cos(pickup_latitude) * np.cos(dropoff_l
atitude) * np.sin(dlong/2.0)**2
    c = 2 * np.arcsin(np.sqrt(a))
    distance = 6367 * c
    return distance

train_df['distance'] = distance(train_df['pickup_longitude'], train_df[
'pickup_latitude'],
                            train_df['dropoff_longitude'], train_df['dro
poff_latitude'])
```

In [23]:

```
train_df.head(1)
```

Out[23]:

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dr
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21	-73.844311	40.721319	-7

In [24]:

```
print(train_df.corrwith(train_df['fare_amount']))
```

```
fare_amount          1.000000
pickup_longitude     0.380484
pickup_latitude     -0.189488
dropoff_longitude    0.290090
dropoff_latitude    -0.158196
passenger_count      0.014383
hour                -0.019302
year                 0.117216
month                0.025561
date                 0.001324
day                  0.002705
distance             0.821817
dtype: float64
```

In [25]:

```
def absolute_coordinates(data):
    data['absolute_longitude'] = (data.dropoff_longitude - data.pickup_l
ongitude).abs()
    data['absolute_latitude'] = (data.dropoff_latitude - data.pickup_lat
itude).abs()
    return data

train_df=absolute_coordinates(train_df)
```

In [26]:

```
train_df.head(2)
```

Out[26]:

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dr
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21	-73.844311	40.721319	-7
1	2010-01-05 16:52:16.0000002	16.9	2010-01-05 16:52:16	-74.016048	40.711303	-7

In [27]:

```
def E_distance(lat1, long1, lat2, long2):
    sqlat=(lat1-lat2)**2
    sqlong=(long1-long2)**2
    e_distance = np.sqrt(sqlat+sqlong)
    return e_distance
```

In [28]:

```
train_df['e_distance'] = E_distance(train_df.pickup_latitude, train_df.p
ickup_longitude,
                                     train_df.dropoff_latitude, train_df.dropo
ff_longitude)
```

In [29]:
```
train_df.head(5)
```

Out[29]:

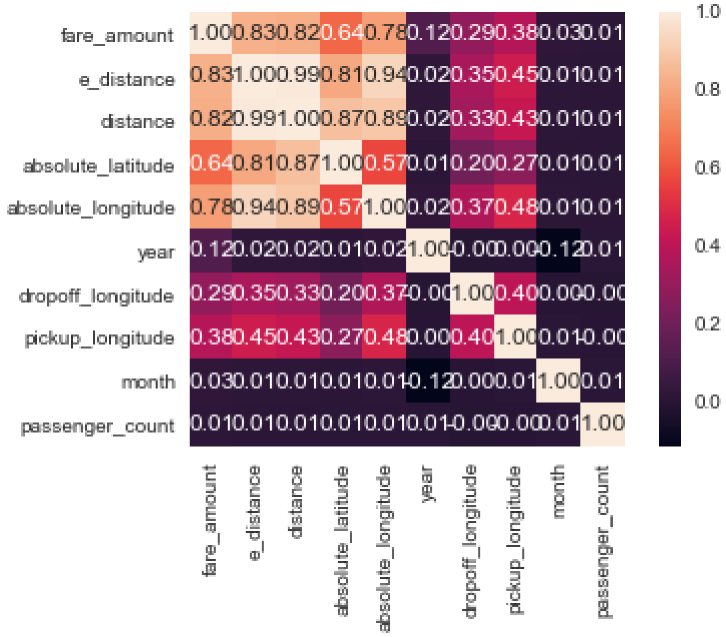
	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21	-73.844311	40.721319
1	2010-01-05 16:52:16.0000002	16.9	2010-01-05 16:52:16	-74.016048	40.711303
2	2011-08-18 00:35:00.00000049	5.7	2011-08-18 00:35:00	-73.982738	40.761270
3	2012-04-21 04:30:42.0000001	7.7	2012-04-21 04:30:42	-73.987130	40.733143
4	2010-03-09 07:51:00.000000135	5.3	2010-03-09 07:51:00	-73.968095	40.768008

In [30]:
```
print(train_df.corrwith(train_df['fare_amount']))
```

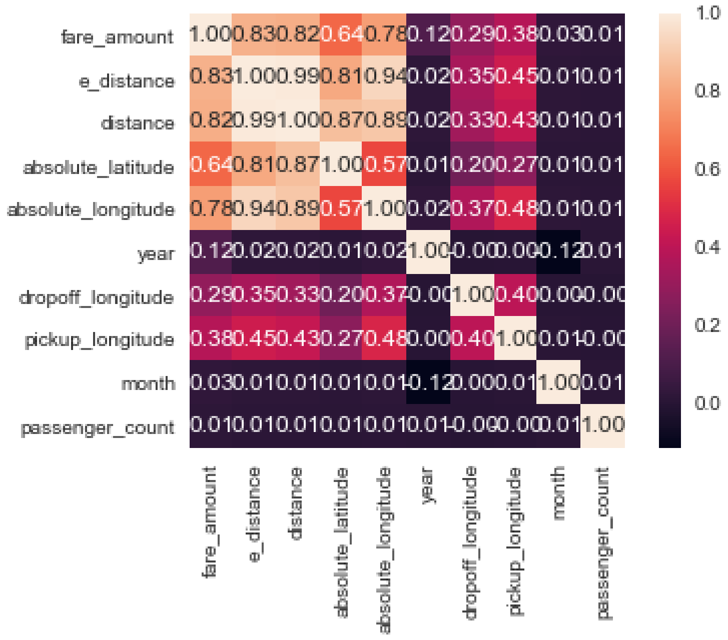
```
fare_amount           1.000000
pickup_longitude      0.380484
pickup_latitude      -0.189488
dropoff_longitude     0.290090
dropoff_latitude     -0.158196
passenger_count       0.014383
hour                 -0.019302
year                  0.117216
month                 0.025561
date                  0.001324
day                   0.002705
distance              0.821817
absolute_longitude    0.778014
absolute_latitude     0.643646
e_distance            0.830235
dtype: float64
```

In [146]:

```
import seaborn as sns
import matplotlib.pyplot as plt

spearman_correlation = train_df.corr(method='spearman')
pick_columns=spearman_correlation.nlargest(10, 'fare_amount').index
correlationmap = np.corrcoef(train_df[pick_columns].values.T)
sns.set(font_scale=1.0)
heatmap = sns.heatmap(correlationmap, cbar=True, annot=True, square=True
, fmt='.2f', yticklabels=columns_new.values, xticklabels=columns_new.val
ues)

plt.show()
```



In [147]:
```
import seaborn as sns
import matplotlib.pyplot as plt

spearman_correlation = train_df.corr(method='spearman')
pick_columns=spearman_correlation.nlargest(10, 'fare_amount').index
correlationmap = np.corrcoef(train_df[pick_columns].values.T)
sns.set(font_scale=1.0)
heatmap = sns.heatmap(correlationmap, cbar=True, annot=True, square=True
, fmt='.2f', yticklabels=columns_new.values, xticklabels=columns_new.val
ues)

plt.show()
```



In [33]:
```
print(train_df.corrwith(train_df['fare_amount']))
```

```
fare_amount           1.000000
pickup_longitude      0.380484
pickup_latitude      -0.189488
dropoff_longitude     0.290090
dropoff_latitude     -0.158196
passenger_count       0.014383
hour                 -0.019302
year                  0.117216
month                 0.025561
date                  0.001324
day                   0.002705
distance              0.821817
absolute_longitude    0.778014
absolute_latitude     0.643646
e_distance            0.830235
dtype: float64
```

In [35]:

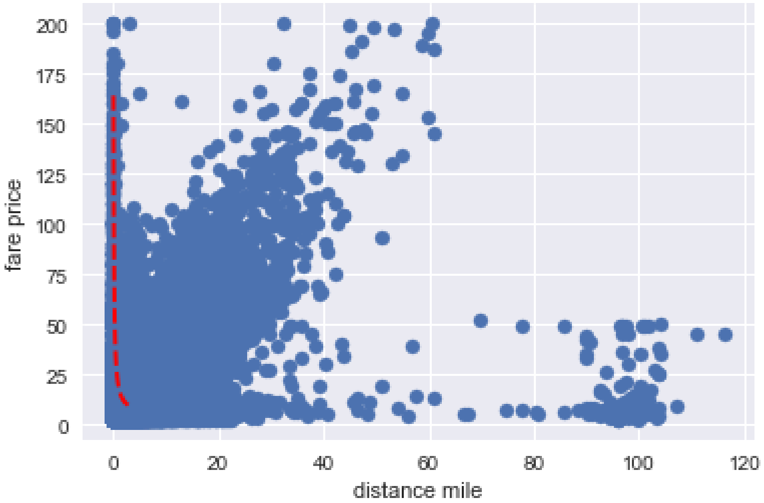
```
train_df.corr(method='pearson')
```

Out[35]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	d
fare_amount	1.000000	0.380484	-0.189488	0.290090	-0
pickup_longitude	0.380484	1.000000	0.127059	0.400761	0.
pickup_latitude	-0.189488	0.127059	1.000000	0.152140	0.
dropoff_longitude	0.290090	0.400761	0.152140	1.000000	0.
dropoff_latitude	-0.158196	0.134755	0.477618	0.224905	1.
passenger_count	0.014383	-0.000187	-0.008182	-0.001703	-0
hour	-0.019302	0.017943	0.027865	-0.041459	0.
year	0.117216	0.002308	-0.019389	-0.000607	-0
month	0.025561	0.006070	-0.003308	0.003969	-0
date	0.001324	-0.000718	-0.001333	0.001591	-0
day	0.002705	-0.023948	-0.037401	-0.001651	-0
distance	0.821817	0.427645	-0.150194	0.331222	-0
absolute_longitude	0.778014	0.480205	-0.142469	0.370528	-0
absolute_latitude	0.643646	0.274334	-0.121836	0.204497	-0
e_distance	0.830235	0.449165	-0.151735	0.347684	-0

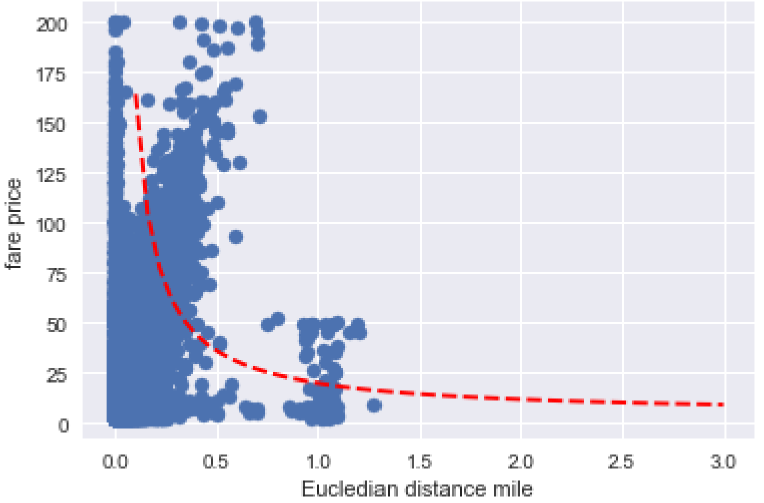
In [38]:

```
import matplotlib.pyplot as plt

plt.scatter(train_df.distance, train_df.fare_amount)
plt.xlabel('distance mile')
plt.ylabel('fare price')

# theta here is estimated by hand
theta = (16, 4.0)
x = np.linspace(0.1, 3, 50)
plt.plot(x, theta[0]/x + theta[1], '--', c='r', lw=2);
```



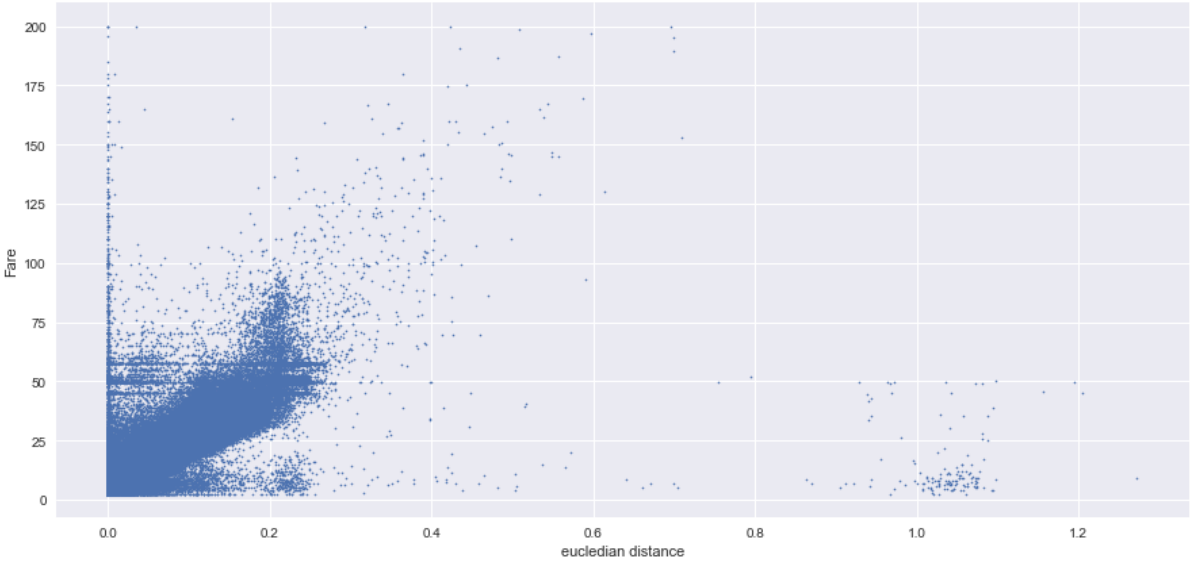
In [39]:

```
import matplotlib.pyplot as plt

plt.scatter(train_df.e_distance, train_df.fare_amount)
plt.xlabel('Eucledian distance mile')
plt.ylabel('fare price')

# theta here is estimated by hand
theta = (16, 4.0)
x = np.linspace(0.1, 3, 50)
plt.plot(x, theta[0]/x + theta[1], '--', c='r', lw=2);
```



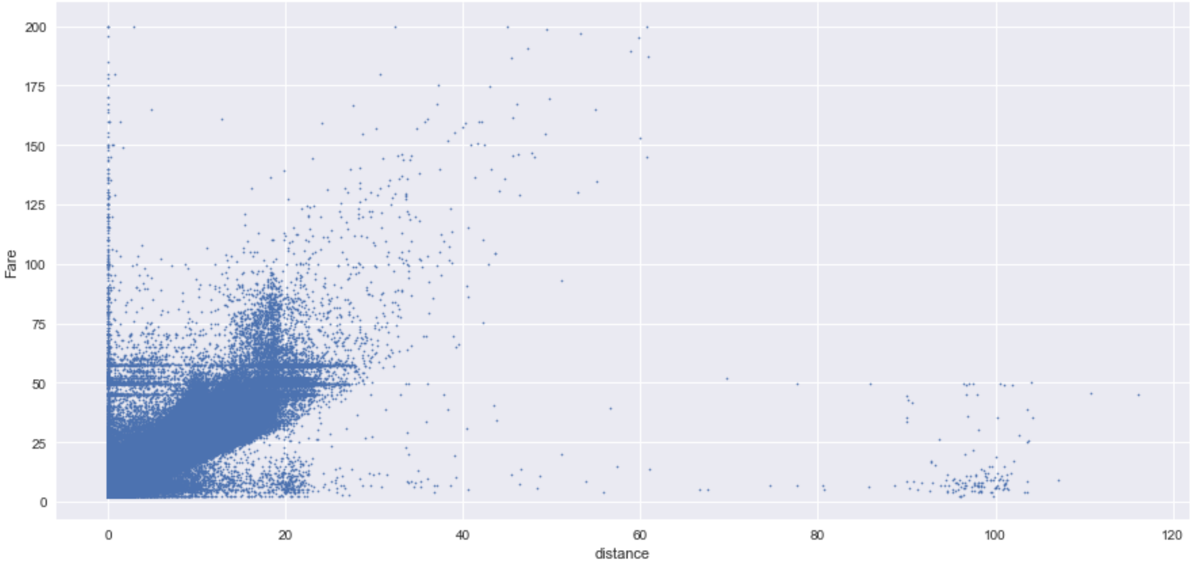
```
In [41]: plt.figure(figsize=(15,7))
         plt.scatter(x=train_df['e_distance'], y=train_df['fare_amount'], s=1.5)
         plt.xlabel('eucledian distance')
         plt.ylabel('Fare')
```

```
Out[41]: Text(0,0.5,'Fare')
```



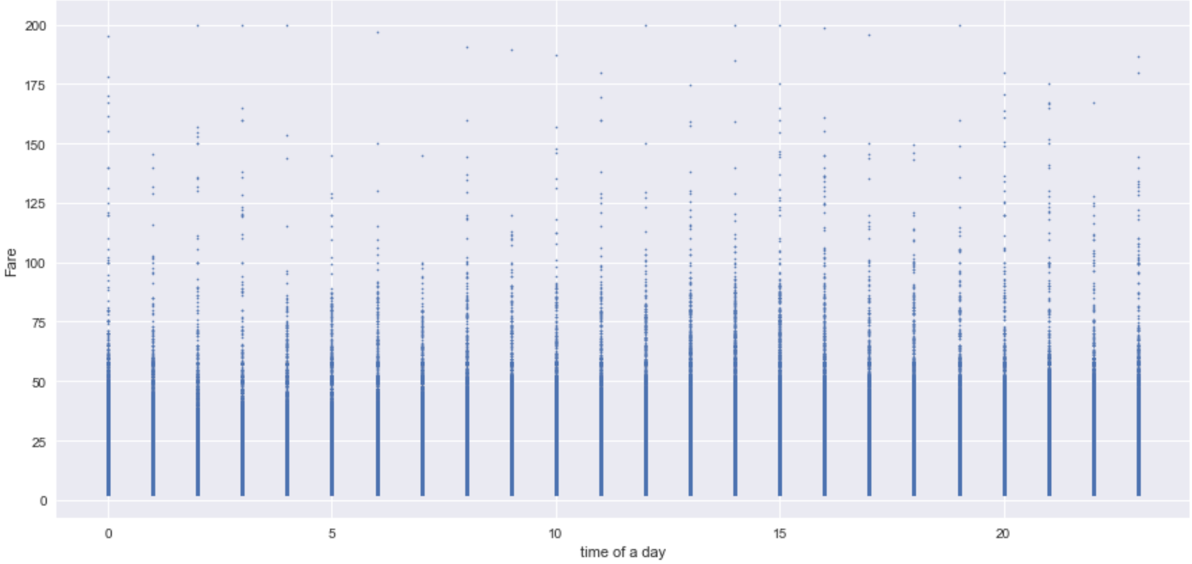
```
In [42]: plt.figure(figsize=(15,7))
         plt.scatter(x=train_df['distance'], y=train_df['fare_amount'], s=1.5)
         plt.xlabel('distance')
         plt.ylabel('Fare')
```

```
Out[42]: Text(0,0.5,'Fare')
```

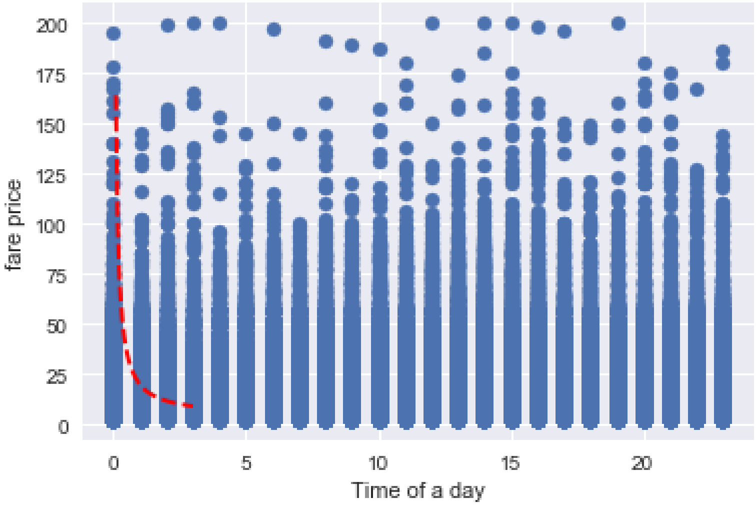


In [43]:
```
plt.figure(figsize=(15,7))
plt.scatter(x=train_df['hour'], y=train_df['fare_amount'], s=1.5)
plt.xlabel('time of a day')
plt.ylabel('Fare')
```

Out[43]:
```
Text(0,0.5,'Fare')
```



In [44]:
```
import matplotlib.pyplot as plt

plt.scatter(train_df.hour, train_df.fare_amount)
plt.xlabel('Time of a day')
plt.ylabel('fare price')

# theta here is estimated by hand
theta = (16, 4.0)
x = np.linspace(0.1, 3, 50)
plt.plot(x, theta[0]/x + theta[1], '--', c='r', lw=2);
```

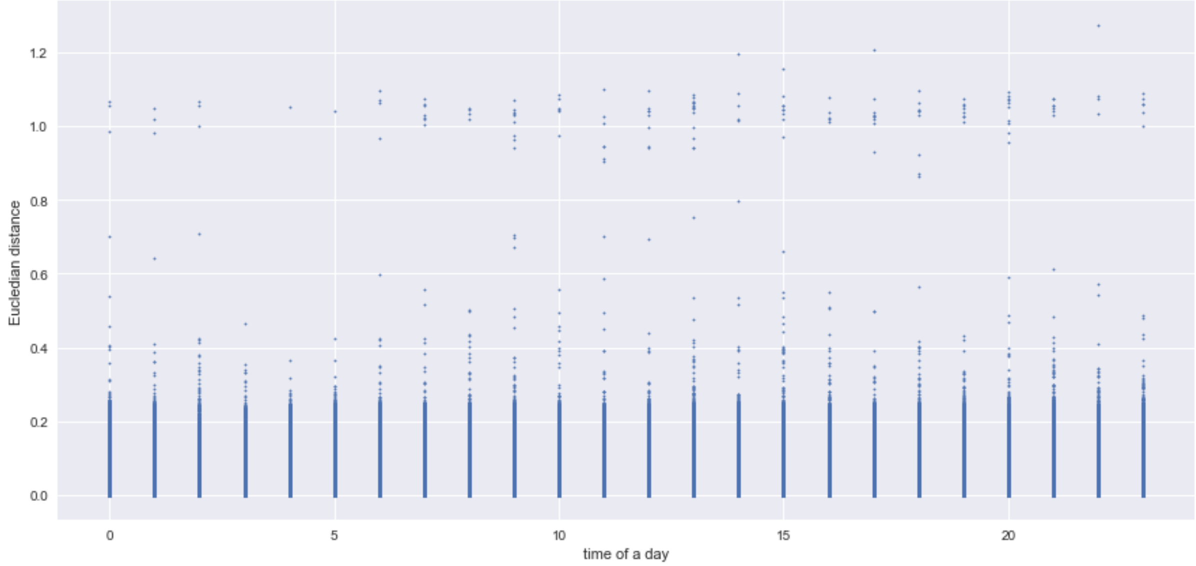


In [45]:

```
plt.figure(figsize=(15,7))
plt.scatter(x=train_df['hour'], y=train_df['e_distance'], s=2)
plt.xlabel('time of a day')
plt.ylabel('Eucledian distance')
```

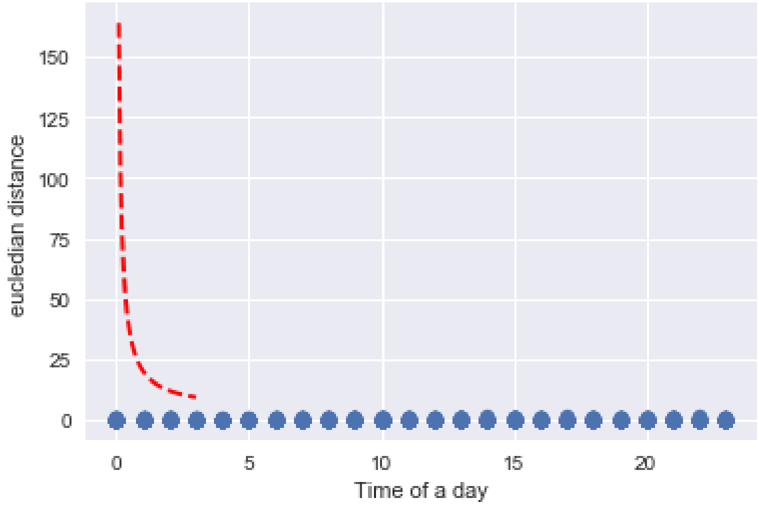
Out[45]:

```
Text(0,0.5,'Eucledian distance')
```



In [46]:

```
import matplotlib.pyplot as plt

plt.scatter(train_df.hour, train_df.e_distance)
plt.xlabel('Time of a day')
plt.ylabel('eucledian distance')

# theta here is estimated by hand
theta = (16, 4.0)
x = np.linspace(0.1, 3, 50)
plt.plot(x, theta[0]/x + theta[1], '--', c='r', lw=2);
```



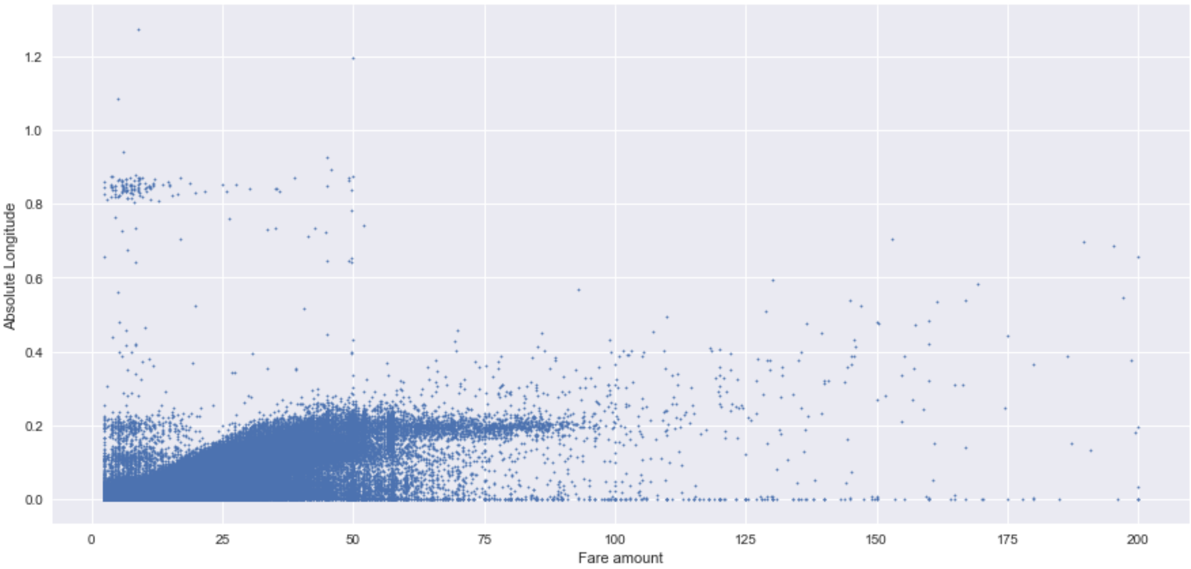
In [47]:
```
train_df.head(2)
```

Out[47]:

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dr
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21	-73.844311	40.721319	-7
1	2010-01-05 16:52:16.0000002	16.9	2010-01-05 16:52:16	-74.016048	40.711303	-7

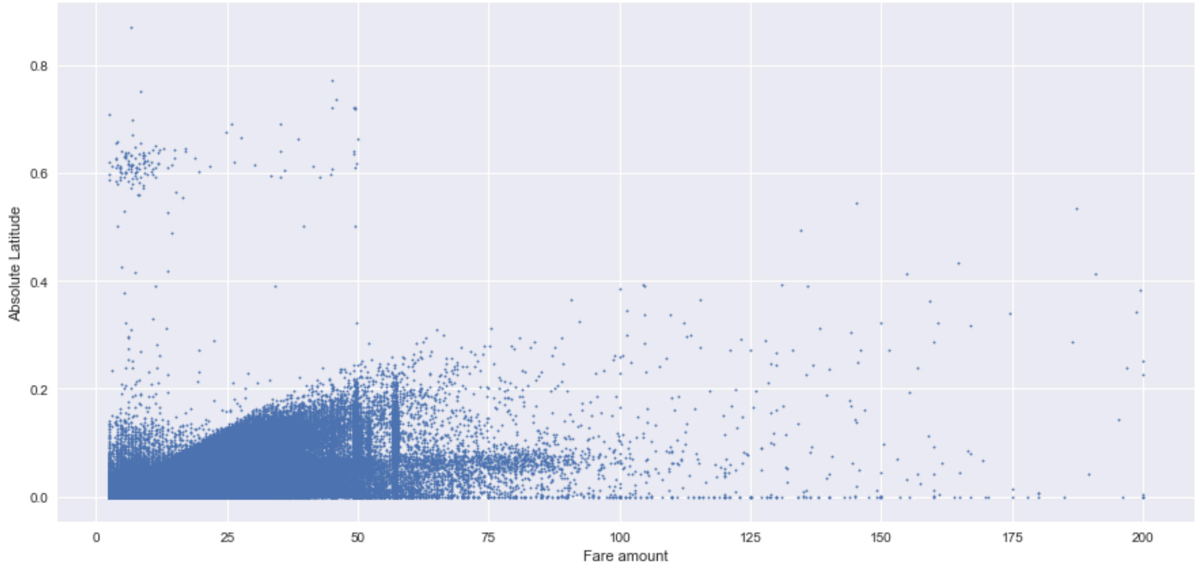
In [48]:
```
plt.figure(figsize=(15,7))
plt.scatter(x=train_df['fare_amount'], y=train_df['absolute_longitude'],
 s=2)
plt.xlabel('Fare amount')
plt.ylabel('Absolute Longitude')
```

Out[48]:
```
Text(0,0.5,'Absolute Longitude')
```



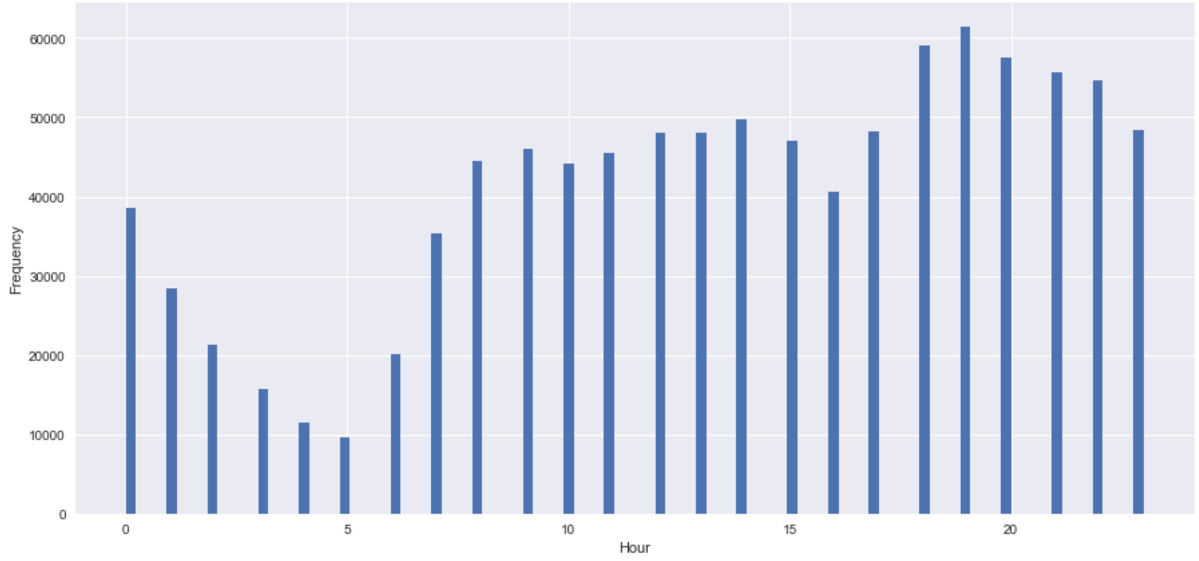
```
In [49]: plt.figure(figsize=(15,7))
         plt.scatter(x=train_df['fare_amount'], y=train_df['absolute_latitude'],
         s=2)
         plt.xlabel('Fare amount')
         plt.ylabel('Absolute Latitude')
```

```
Out[49]: Text(0,0.5,'Absolute Latitude')
```

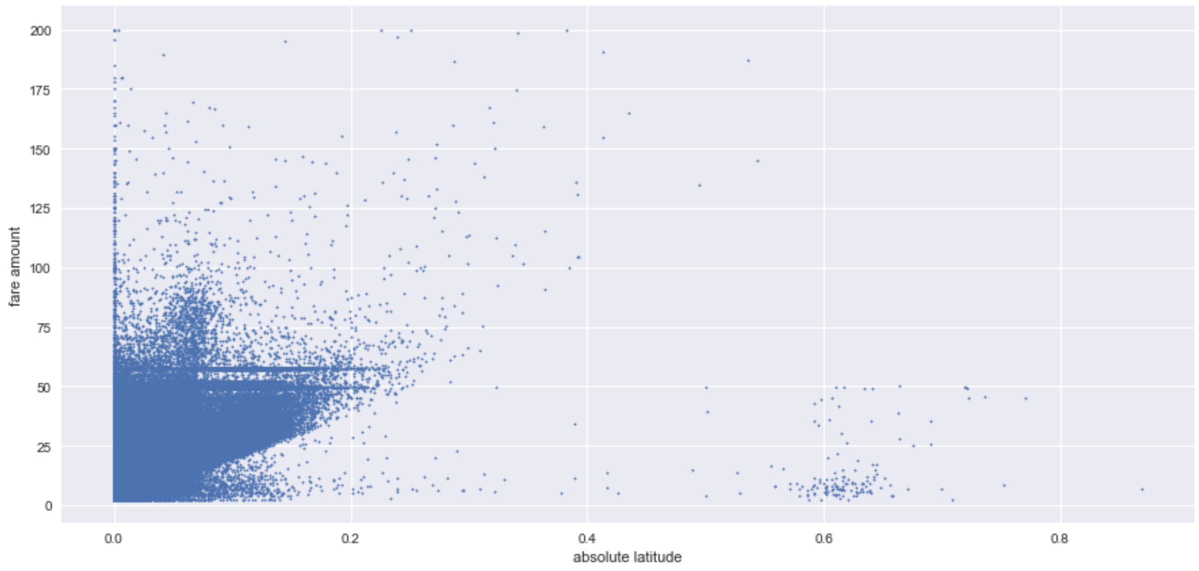


```
In [51]: plt.figure(figsize=(15,7))
         plt.hist(train_df['hour'], bins=100)
         plt.xlabel('Hour')
         plt.ylabel('Frequency')
```

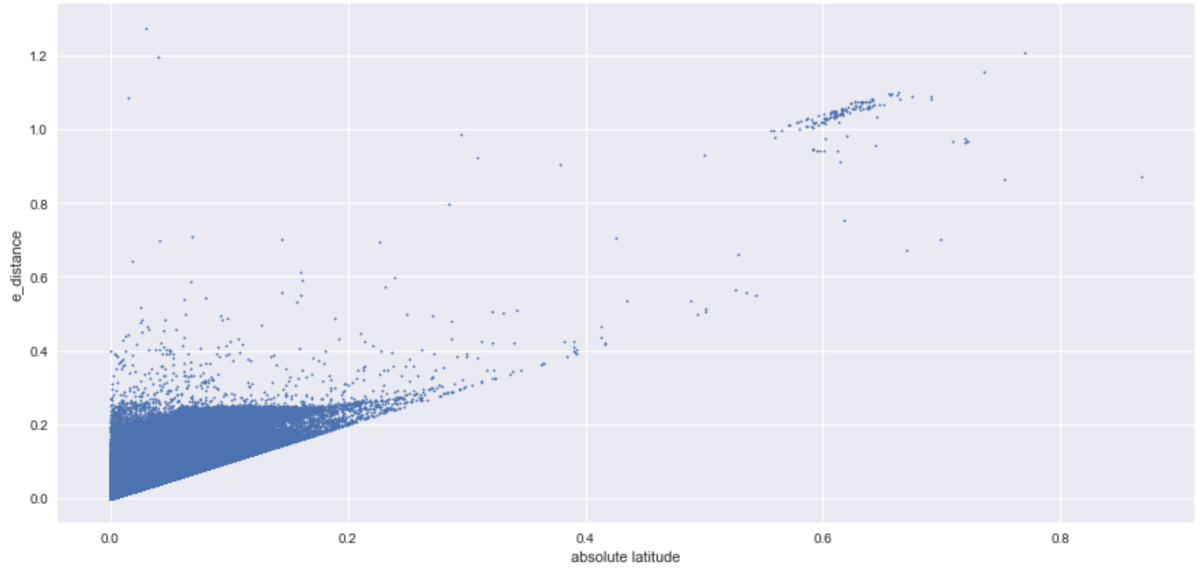
```
Out[51]: Text(0,0.5,'Frequency')
```



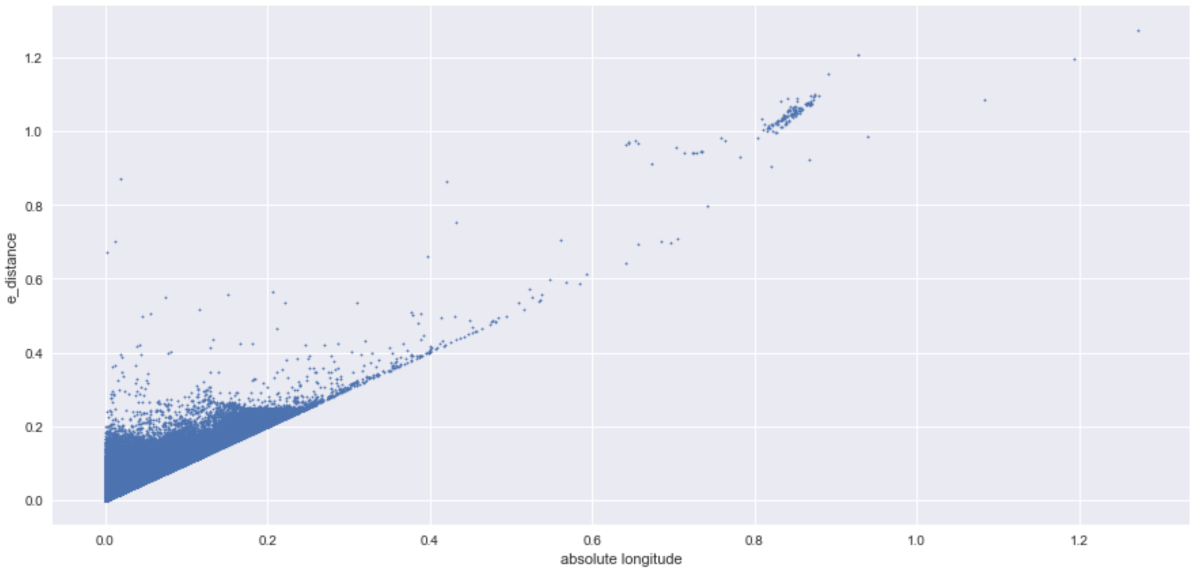
```
In [52]: plt.figure(figsize=(15,7))
         plt.scatter(x=train_df['absolute_latitude'], y=train_df['fare_amount'],
         s=2)
         plt.xlabel('absolute latitude')
         plt.ylabel('fare amount')

Out[52]: Text(0,0.5,'fare amount')
```



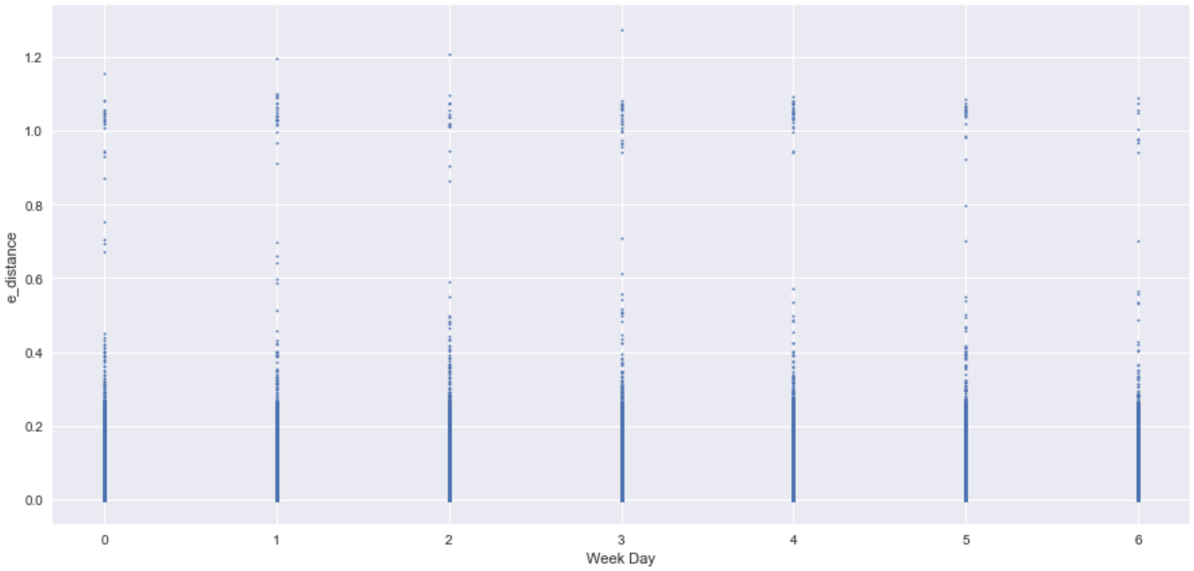
```
In [53]: plt.figure(figsize=(15,7))
         plt.scatter(x=train_df['absolute_latitude'], y=train_df['e_distance'], s
         =2)
         plt.xlabel('absolute latitude')
         plt.ylabel('e_distance')

Out[53]: Text(0,0.5,'e_distance')
```



```
In [54]: plt.figure(figsize=(15,7))
         plt.scatter(x=train_df['absolute_longitude'], y=train_df['e_distance'],
         s=2)
         plt.xlabel('absolute longitude')
         plt.ylabel('e_distance')

Out[54]: Text(0,0.5,'e_distance')
```

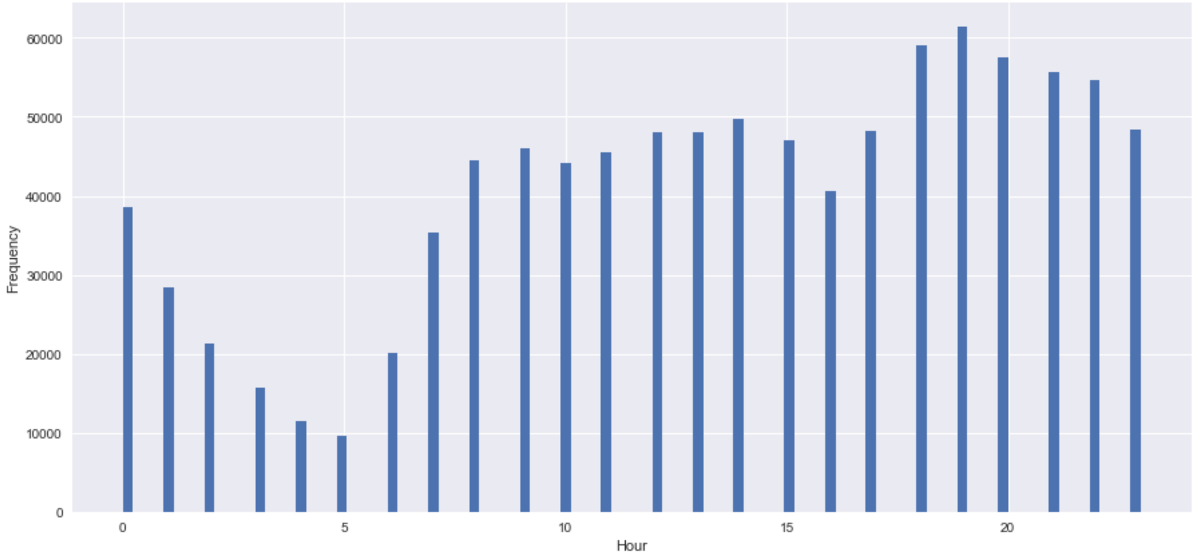


```
In [55]: plt.figure(figsize=(15,7))
         plt.scatter(x=train_df['day'], y=train_df['e_distance'], s=2)
         plt.xlabel('Week Day')
         plt.ylabel('e_distance')

Out[55]: Text(0,0.5,'e_distance')
```



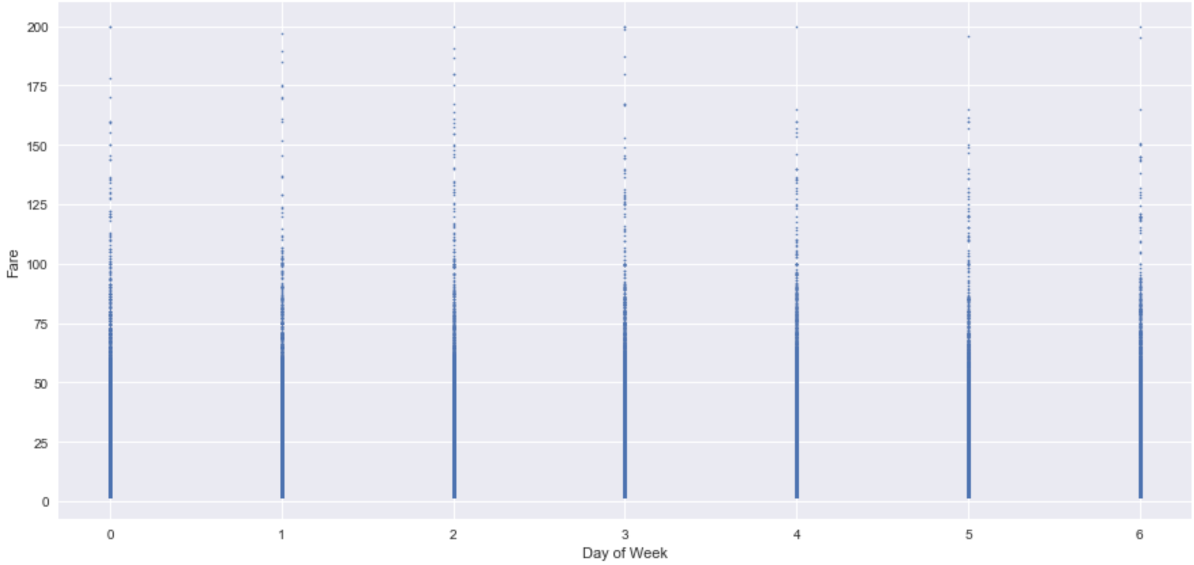
In [57]:
```
plt.figure(figsize=(15,7))
plt.hist(train_df['hour'], bins=100)
plt.xlabel('Hour')
plt.ylabel('Frequency')
```

Out[57]:
```
Text(0,0.5,'Frequency')
```



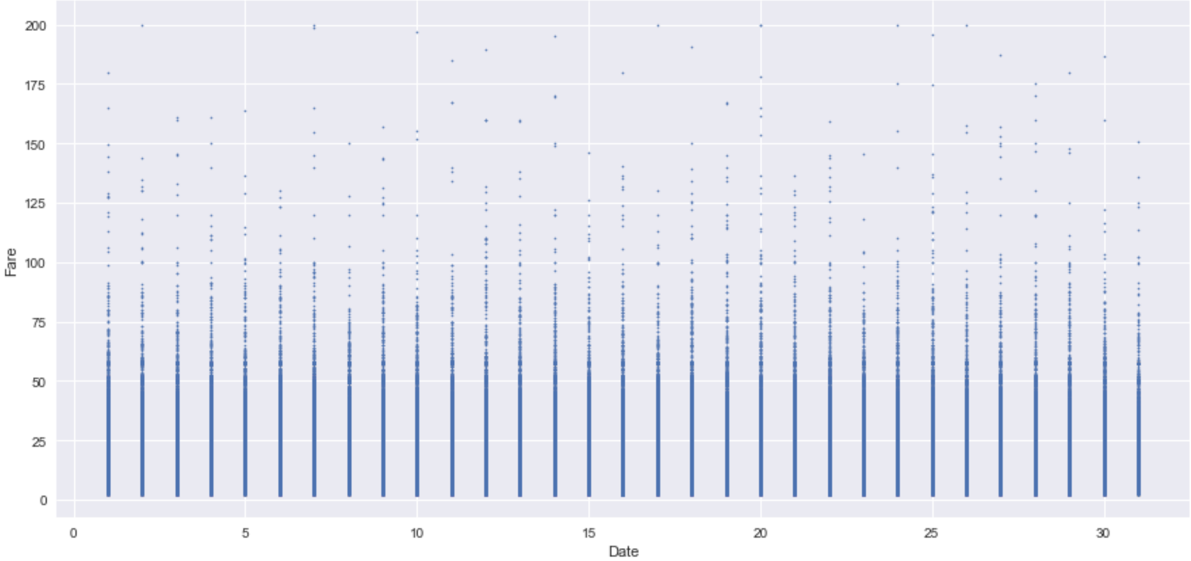
In [59]:
```
plt.figure(figsize=(15,7))
plt.scatter(x=train_df['day'], y=train_df['fare_amount'], s=1.5)
plt.xlabel('Day of Week')
plt.ylabel('Fare')
```

Out[59]:
```
Text(0,0.5,'Fare')
```



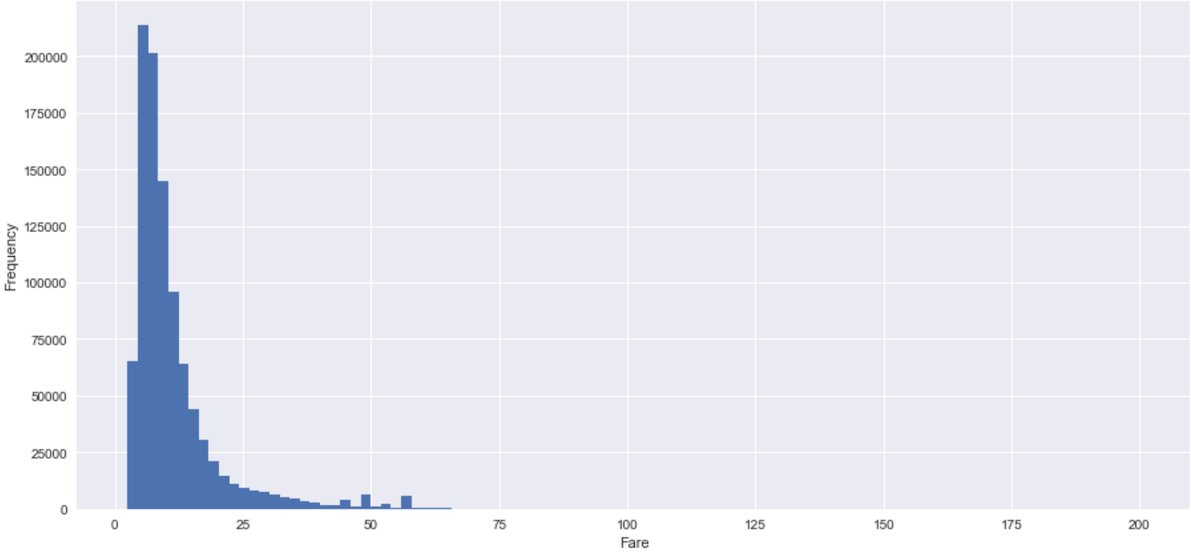
In [61]:
```
plt.figure(figsize=(15,7))
plt.scatter(x=train_df['date'], y=train_df['fare_amount'], s=1.5)
plt.xlabel('Date')
plt.ylabel('Fare')
```

Out[61]:
```
Text(0,0.5,'Fare')
```



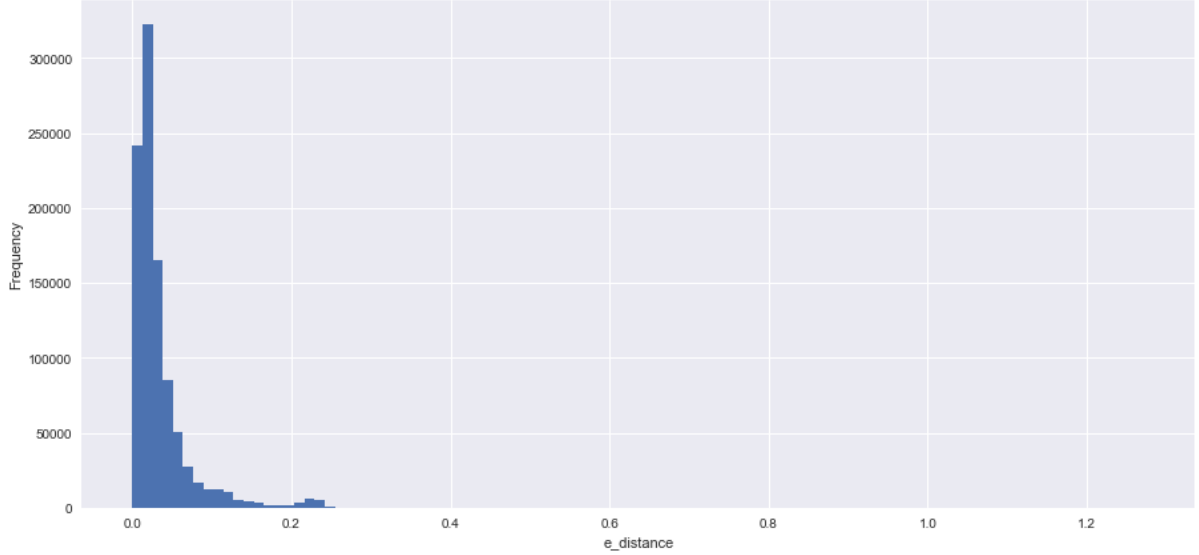
In [65]:
```
plt.figure(figsize=(15,7))
plt.hist(train_df['fare_amount'], bins=100)
plt.xlabel('Fare')
plt.ylabel('Frequency')
```

Out[65]:
```
Text(0,0.5,'Frequency')
```



```
In [66]: plt.figure(figsize=(15,7))
         plt.hist(train_df['e_distance'], bins=100)
         plt.xlabel('e_distance')
         plt.ylabel('Frequency')
```

```
Out[66]: Text(0,0.5,'Frequency')
```



```
In [67]: train_df.corr(method='pearson')
```

```
Out[67]:
```

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	d
fare_amount	1.000000	0.380484	-0.189488	0.290090	-(
pickup_longitude	0.380484	1.000000	0.127059	0.400761	0.
pickup_latitude	-0.189488	0.127059	1.000000	0.152140	0.
dropoff_longitude	0.290090	0.400761	0.152140	1.000000	0.
dropoff_latitude	-0.158196	0.134755	0.477618	0.224905	1.
passenger_count	0.014383	-0.000187	-0.008182	-0.001703	-(
hour	-0.019302	0.017943	0.027865	-0.041459	0.
year	0.117216	0.002308	-0.019389	-0.000607	-(
month	0.025561	0.006070	-0.003308	0.003969	-(
date	0.001324	-0.000718	-0.001333	0.001591	-(
day	0.002705	-0.023948	-0.037401	-0.001651	-(
distance	0.821817	0.427645	-0.150194	0.331222	-(
absolute_longitude	0.778014	0.480205	-0.142469	0.370528	-(
absolute_latitude	0.643646	0.274334	-0.121836	0.204497	-(
e_distance	0.830235	0.449165	-0.151735	0.347684	-(

In [68]:
```
train_df.head(2)
```

Out[68]:

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dr
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21	-73.844311	40.721319	-7
1	2010-01-05 16:52:16.0000002	16.9	2010-01-05 16:52:16	-74.016048	40.711303	-7

In [69]:
```
train_df.shape
```

```
Out[69]: (979060, 17)
```

In [70]:
```
train_df_train = train_df[:600000]
train_df_test = train_df[600001:]
```

In [72]:
```
from sklearn.pipeline import Pipeline
from sklearn.linear_model import LinearRegression
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import mean_squared_error

train_df_train=train_df_train.drop(['key','pickup_datetime'], axis = 1)
train_df_test=train_df_test.drop(['key','pickup_datetime'], axis = 1)
```

In [73]:
```
train_df_train.shape
```

```
Out[73]: (600000, 17)
```

In [74]:
```
train_df_test.shape
```

```
Out[74]: (379059, 15)
```

In [75]:
```
train_df_train=train_df_train.drop(['key','pickup_datetime'], axis = 1)
```

In [76]:
```
train_df_train.shape
```

```
Out[76]: (600000, 15)
```

In [78]:
```
train_df_test.head(1)
```

Out[78]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitu
612897	10.5	-74.005414	40.736925	-73.973531	40.754818

In [79]:
```
train_df_train = train_df[:600000]
train_df_train=train_df_train.drop(['key','pickup_datetime'], axis = 1)
train_df_train.shape
```

```
Out[79]: (600000, 15)
```

In [80]:
```
train_df_test.shape
```

Out[80]:
```
(379059, 15)
```

In [81]:
```
train_df_test.head(1)
```

Out[81]:

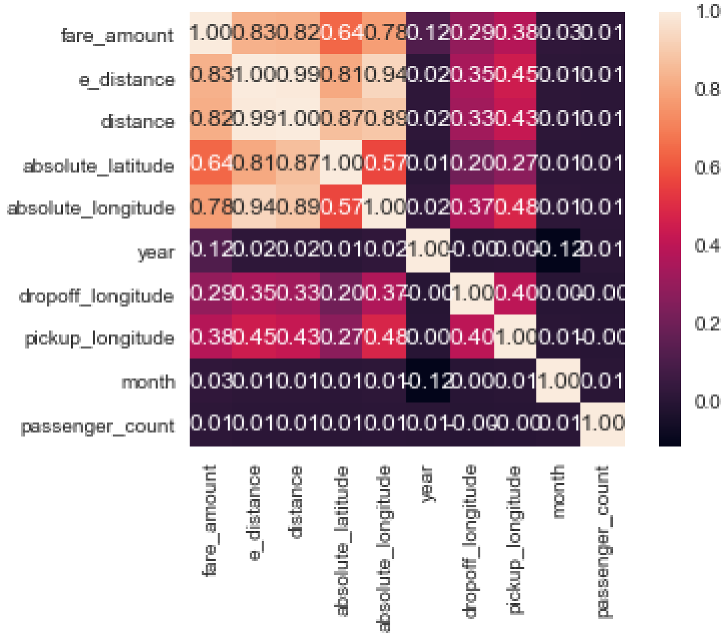
	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitu
612897	10.5	-74.005414	40.736925	-73.973531	40.754818

In [82]:
```
train_df_train.head(1)
```

Out[82]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	pa
0	4.5	-73.844311	40.721319	-73.84161	40.712278	1

In [148]:
```
import seaborn as sns
import matplotlib.pyplot as plt

spearman_correlation = train_df.corr(method='spearman')
pick_columns=spearman_correlation.nlargest(10, 'fare_amount').index
correlationmap = np.corrcoef(train_df[pick_columns].values.T)
sns.set(font_scale=1.0)
heatmap = sns.heatmap(correlationmap, cbar=True, annot=True, square=True
, fmt='.2f', yticklabels=columns_new.values, xticklabels=columns_new.val
ues)

plt.show()
```



In [84]:
```
train_df_train.corr(method='pearson')
```

Out[84]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	d
fare_amount	1.000000	0.378509	-0.190201	0.293431	-0
pickup_longitude	0.378509	1.000000	0.121854	0.399245	0.
pickup_latitude	-0.190201	0.121854	1.000000	0.146242	0.
dropoff_longitude	0.293431	0.399245	0.146242	1.000000	0.
dropoff_latitude	-0.160454	0.129408	0.475894	0.221165	1.
passenger_count	0.015512	0.000417	-0.007644	-0.002148	-0
hour	-0.019601	0.016823	0.028402	-0.041793	0.
year	0.118150	0.002458	-0.019085	-0.000658	-0
month	0.025915	0.005252	-0.004989	0.003540	-0
date	0.001582	-0.000147	-0.001851	0.002497	-0
day	0.003794	-0.023110	-0.037026	-0.000431	-0
distance	0.820697	0.426361	-0.148876	0.336094	-0
absolute_longitude	0.776904	0.477614	-0.141830	0.375410	-0
absolute_latitude	0.642137	0.274753	-0.120143	0.207327	-0
e_distance	0.829034	0.447487	-0.150511	0.352687	-0

In [85]:
```
train_df_train=train_df_train.drop(['hour','passenger_count', 'month',
'date', 'day'], axis = 1)
train_df_test=train_df_test.drop(['hour','passenger_count', 'month', 'da
te', 'day'], axis = 1)
```

In [86]:
```
train_df_train.head(1)
```

Out[86]:

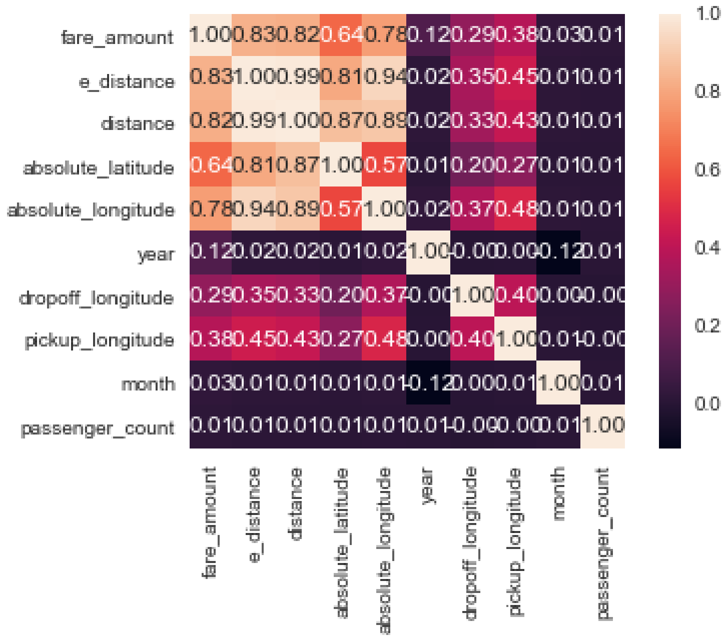
	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	ye
0	4.5	-73.844311	40.721319	-73.84161	40.712278	20

In [87]:
```
train_df_test.head(1)
```

Out[87]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitu
612897	10.5	-74.005414	40.736925	-73.973531	40.754818

In [149]:
```
import seaborn as sns
import matplotlib.pyplot as plt

spearman_correlation = train_df.corr(method='spearman')
pick_columns=spearman_correlation.nlargest(10, 'fare_amount').index
correlationmap = np.corrcoef(train_df[pick_columns].values.T)
sns.set(font_scale=1.0)
heatmap = sns.heatmap(correlationmap, cbar=True, annot=True, square=True
, fmt='.2f', yticklabels=columns_new.values, xticklabels=columns_new.val
ues)

plt.show()
```



In [89]:
```
X = train_df_train.drop('fare_amount',axis=1)
y = y = train_df_train[['fare_amount']]
```

In [91]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3,
 random_state=42)
```

In [92]:
```
from sklearn.metrics import mean_squared_error, explained_variance_score
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)
```

In [150]:

```
#Thanks to Abhishek Reddy Y N for helping me with this API
from sklearn.metrics import mean_squared_error

standard_scaler = StandardScaler().fit(X_train)
rescaled_X_train = standard_scaler.transform(X_train)
lin_model = LinearRegression()
lin_model.fit(rescaled_X_train, y_train)
pred = lin_model.predict(X_test)
error = np.sqrt(mean_squared_error(y_test,pred))
print(error)
```

```
1835.9237230723259
```

In [151]:

```
print(pred)
```

```
[[1849.90727538]
 [1842.94903849]
 [1848.60092089]
 ...
 [1846.83974631]
 [1844.98424555]
 [1846.42364865]]
```

In [95]:

```
train_df_train = train_df
```

In [96]:

```
from sklearn.pipeline import Pipeline
from sklearn.linear_model import LinearRegression
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import mean_squared_error

train_df_train=train_df_train.drop(['key','pickup_datetime'], axis = 1)
```

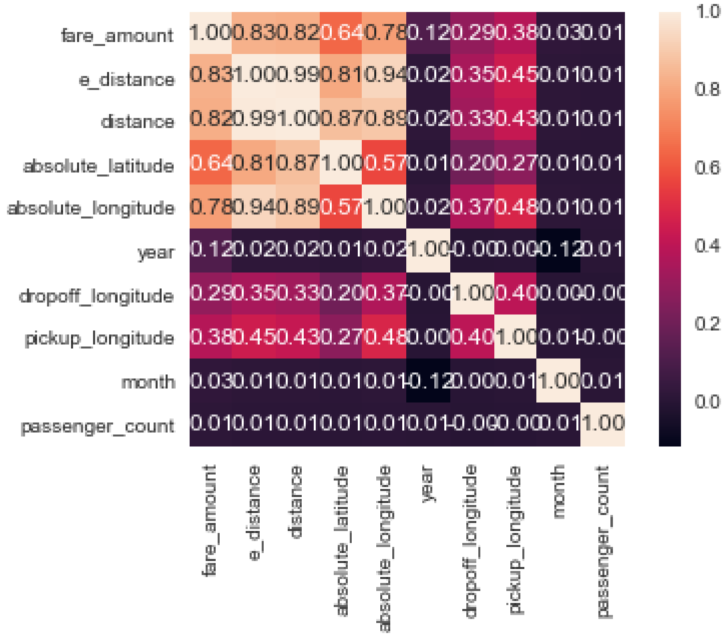
In [97]:

```
train_df_train.head()
```

Out[97]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	pa
0	4.5	-73.844311	40.721319	-73.841610	40.712278	1
1	16.9	-74.016048	40.711303	-73.979268	40.782004	1
2	5.7	-73.982738	40.761270	-73.991242	40.750562	2
3	7.7	-73.987130	40.733143	-73.991567	40.758092	1
4	5.3	-73.968095	40.768008	-73.956655	40.783762	1

In [152]:
```
import seaborn as sns
import matplotlib.pyplot as plt

spearman_correlation = train_df.corr(method='spearman')
pick_columns=spearman_correlation.nlargest(10, 'fare_amount').index
correlationmap = np.corrcoef(train_df[pick_columns].values.T)
sns.set(font_scale=1.0)
heatmap = sns.heatmap(correlationmap, cbar=True, annot=True, square=True
, fmt='.2f', yticklabels=columns_new.values, xticklabels=columns_new.val
ues)

plt.show()
```



In [99]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)
```

In [100]:
```
from sklearn.metrics import mean_squared_error, explained_variance_score
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)
```

In [153]:
```
from sklearn.metrics import mean_squared_error

standard_scaler = StandardScaler().fit(X_train)
rescaled_X_train = standard_scaler.transform(X_train)
lin_model = LinearRegression()
lin_model.fit(rescaled_X_train, y_train)
pred = lin_model.predict(X_test)
error = np.sqrt(mean_squared_error(y_test,pred))
print(error)
```

```
1835.9237230723259
```

In [102]:
```
train_df_train=train_df_train.drop(['passenger_count','hour','date','mon
th','day'], axis = 1)
```

In [103]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)
```

In [104]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.5)
```

In [154]:

```
from sklearn.metrics import mean_squared_error

standard_scaler = StandardScaler().fit(X_train)
rescaled_X_train = standard_scaler.transform(X_train)
lin_model = LinearRegression()
lin_model.fit(rescaled_X_train, y_train)
pred = lin_model.predict(X_test)
error = np.sqrt(mean_squared_error(y_test,pred))
print(error)
```

```
1835.9237230723259
```

In [141]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4)
```

In [155]:

```
from sklearn.metrics import mean_squared_error

standard_scaler = StandardScaler().fit(X_train)
rescaled_X_train = standard_scaler.transform(X_train)
lin_model = LinearRegression()
lin_model.fit(rescaled_X_train, y_train)
pred = lin_model.predict(X_test)
error = np.sqrt(mean_squared_error(y_test,pred))
print(error)
```

```
1835.9237230723259
```

In [156]:

```
print(pred)
```

```
[[1849.90727538]
 [1842.94903849]
 [1848.60092089]
 ...
 [1846.83974631]
 [1844.98424555]
 [1846.42364865]]
```

```
In [157]: train_df_train.corr(method='pearson')
```

Out[157]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	d
fare_amount	1.000000	0.380484	-0.189488	0.290090	-0
pickup_longitude	0.380484	1.000000	0.127059	0.400761	0.
pickup_latitude	-0.189488	0.127059	1.000000	0.152140	0.
dropoff_longitude	0.290090	0.400761	0.152140	1.000000	0.
dropoff_latitude	-0.158196	0.134755	0.477618	0.224905	1.
year	0.117216	0.002308	-0.019389	-0.000607	-0
distance	0.821817	0.427645	-0.150194	0.331222	-0
absolute_longitude	0.778014	0.480205	-0.142469	0.370528	-0
absolute_latitude	0.643646	0.274334	-0.121836	0.204497	-0
e_distance	0.830235	0.449165	-0.151735	0.347684	-0

```
In [158]: train_df_train.shape

Out[158]: (979060, 10)
```

```
In [159]: train_df_train.head(1)
```

Out[159]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	ye
0	4.5	-73.844311	40.721319	-73.84161	40.712278	20

```
In [160]: test_df = pd.read_csv('test.csv')
```

```
In [161]: test_df.shape

Out[161]: (9914, 7)
```

```
In [162]: test_df.isnull().sum().sort_values(ascending=False)

Out[162]: passenger_count      0
          dropoff_latitude     0
          dropoff_longitude    0
          pickup_latitude      0
          pickup_longitude     0
          pickup_datetime      0
          key                  0
          dtype: int64
```

In [163]:

```
test_df.head()
```

Out[163]:

	key	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longituc
0	2015-01-27 13:08:24.0000002	2015-01-27 13:08:24 UTC	-73.973320	40.763805	-73.981430
1	2015-01-27 13:08:24.0000003	2015-01-27 13:08:24 UTC	-73.986862	40.719383	-73.998886
2	2011-10-08 11:53:44.0000002	2011-10-08 11:53:44 UTC	-73.982524	40.751260	-73.979654
3	2012-12-01 21:12:12.0000002	2012-12-01 21:12:12 UTC	-73.981160	40.767807	-73.990448
4	2012-12-01 21:12:12.0000003	2012-12-01 21:12:12 UTC	-73.966046	40.789775	-73.988565

In [164]:

```
test_df['pickup_datetime'] = pd.to_datetime(test_df['pickup_datetime'])
```

In [165]:

```
test_df=extractdatetime(test_df)
test_df['distance'] = distance(test_df['pickup_longitude'], test_df['pic
kup_latitude'],
                              test_df['dropoff_longitude'], test_df['dropo
ff_latitude'])
test_df=absolute_coordinates(test_df)
test_df['e_distance'] = E_distance(test_df.pickup_latitude, test_df.pick
up_longitude,
                                 test_df.dropoff_latitude, test_df.dropoff
_longitude)
```

In [166]:

```
test_df.head(2)
```

Out[166]:

	key	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longituc
0	2015-01-27 13:08:24.0000002	2015-01-27 13:08:24	-73.973320	40.763805	-73.981430
1	2015-01-27 13:08:24.0000003	2015-01-27 13:08:24	-73.986862	40.719383	-73.998886

In [167]:

```
train_df_train.head(2)
```

Out[167]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	ye
0	4.5	-73.844311	40.721319	-73.841610	40.712278	20
1	16.9	-74.016048	40.711303	-73.979268	40.782004	20

```
In [168]: test_df=test_df.drop(['key','pickup_datetime', 'hour', 'month', 'date',
          'day'], axis = 1)
```

```
In [169]: train_df_train.head(2)
```

Out[169]:

	fare_amount	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	ye
0	4.5	-73.844311	40.721319	-73.841610	40.712278	20
1	16.9	-74.016048	40.711303	-73.979268	40.782004	20

```
In [170]: test_df.head(2)
```

Out[170]:

	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	passenger_coun
0	-73.973320	40.763805	-73.981430	40.743835	1
1	-73.986862	40.719383	-73.998886	40.739201	1

```
In [173]: train_df_train.shape

Out[173]: (979060, 10)
```

```
In [172]: test_df.shape

Out[172]: (9914, 10)
```

```
In [174]: test_df=test_df.drop(['passenger_count'], axis = 1)
```

```
In [175]: test_df.shape

Out[175]: (9914, 9)
```

```
In [176]: train_df_train.shape

Out[176]: (979060, 10)
```

```
In [222]: #X = train_df_train.drop('fare_amount',axis=1)
          #y = y = train_df_train[['fare_amount']]
          X_test = test_df
          print(len(X_test))
          X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)

          standard_scaler = StandardScaler().fit(X_train)
          rescaled_X_train = standard_scaler.transform(X_train)
          lin_model = LinearRegression()
          lin_model.fit(rescaled_X_train, y_train)
          pred = lin_model.predict(X_test)
          error = np.sqrt(mean_squared_error(y_test,pred))
          print(error)
          print (len(pred))

          standard_scaler = StandardScaler().fit(y_train)
          rescaled_y_train = standard_scaler.transform(y_train)

          lin_model.fit(X, y)
```

```
9914
1844.7750999716266
180000
```

```
Out[222]: LinearRegression(copy_X=True, fit_intercept=True, n_jobs=1, normalize=F
          alse)
```

```
In [226]: pred = lin_model.predict(test_df)
          print (len(pred))
          #error = np.sqrt(mean_squared_error(test_df,pred))
```

```
9914
```

In [227]:

```
submission = pd.read_csv('sample_submission.csv')
submission['fare_amount'] = pred
submission.to_csv('submission_1.csv', index=False)
submission.head(20)
```

Out[227]:

	key	fare_amount
0	2015-01-27 13:08:24.0000002	10.405672
1	2015-01-27 13:08:24.0000003	11.167005
2	2011-10-08 11:53:44.0000002	5.430308
3	2012-12-01 21:12:12.0000002	7.862343
4	2012-12-01 21:12:12.0000003	13.630410
5	2012-12-01 21:12:12.0000005	10.292270
6	2011-10-06 12:10:20.0000001	6.284617
7	2011-10-06 12:10:20.0000003	50.174724
8	2011-10-06 12:10:20.0000002	11.589737
9	2014-02-18 15:22:20.0000002	7.770670
10	2014-02-18 15:22:20.0000003	10.199812
11	2014-02-18 15:22:20.0000001	15.172109
12	2010-03-29 20:20:32.0000002	5.345419
13	2010-03-29 20:20:32.0000001	7.997740
14	2011-10-06 03:59:12.0000002	9.142839
15	2011-10-06 03:59:12.0000001	12.939857
16	2012-07-15 16:45:04.0000006	5.849995
17	2012-07-15 16:45:04.0000002	9.079442
18	2012-07-15 16:45:04.0000003	6.163742
19	2012-07-15 16:45:04.0000004	5.938246

In [228]:

```
submission.describe()
```

Out[228]:

	fare_amount
count	9914.000000
mean	11.556046
std	8.410039
min	-8.622536
25%	7.251999
50%	9.114863
75%	12.452505
max	180.442190

In [229]:

```
import numpy as np
import pandas as pd
df = pd.read_csv('train.csv', nrows=5000000)
df.shape
```

Out[229]:

```
(5000000, 8)
```

In [230]:

```
required_data = (df['fare_amount'].between(2.5, 200) & df['passenger_count'].between(0, 6) &
                df['pickup_longitude'].between(-74.5, -72.5) & df['dropoff_longitude'].between(-74.5, -72.5) &
                df['pickup_latitude'].between(40, 42) & df['dropoff_latitude'].between(40, 42))
```

In [231]:

```
df = df[required_data]
```

In [232]:

```
df['pickup_datetime'] = pd.to_datetime(df['pickup_datetime'])
```

In [234]:

```
def extractdatetime(data):
    data['hour'] = data['pickup_datetime'].dt.hour
    data['year'] = data['pickup_datetime'].dt.year
    data['month'] = data['pickup_datetime'].dt.month
    data['date'] = data['pickup_datetime'].dt.day
    data['day'] = data['pickup_datetime'].dt.dayofweek
    return data

df=extractdatetime(df)
```

```
In [235]: #Thanks to Stack_Overflow. Another efficient way of calculating distnce
           when co-or are given (Haversine Distance)
          def distance(pickup_longitude, pickup_latitude, dropoff_longitude, dropo
          ff_latitude):
              pickup_longitude, pickup_latitude, dropoff_longitude, dropoff_latitu
          de = map(np.radians, [pickup_longitude,pickup_latitude,dropoff_longitude
          ,dropoff_latitude])
              dlong = dropoff_longitude - pickup_longitude
              dlat = dropoff_latitude - pickup_latitude
              a = np.sin(dlat/2.0)**2 + np.cos(pickup_latitude) * np.cos(dropoff_l
          atitude) * np.sin(dlong/2.0)**2
              c = 2 * np.arcsin(np.sqrt(a))
              distance = 6367 * c
              return distance

          df['distance'] = distance(df['pickup_longitude'], df['pickup_latitude'],
                                      df['dropoff_longitude'], df['dropoff_latitud
          e'])
```

```
In [236]: def absolute_coordinates(data):
              data['absolute_longitude'] = (data.dropoff_longitude - data.pickup_l
          ongitude).abs()
              data['absolute_latitude'] = (data.dropoff_latitude - data.pickup_lat
          itude).abs()
              return data

          df=absolute_coordinates(df)
```

```
In [237]: def E_distance(lat1, long1, lat2, long2):
              sqlat=(lat1-lat2)**2
              sqlong=(long1-long2)**2
              e_distance = np.sqrt(sqlat+sqlong)
              return e_distance

          df['e_distance'] = E_distance(df.pickup_latitude, df.pickup_longitude,
                                          df.dropoff_latitude, df.dropoff_longitude
          )
```

```
In [238]: df.shape

Out[238]: (4893872, 17)
```

```
In [239]: df.head(2)
```

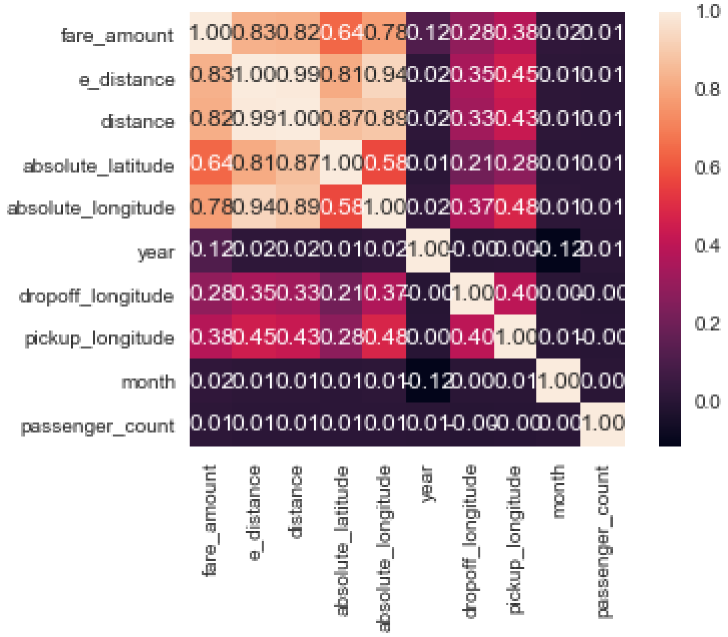
Out[239]:

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dr
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21	-73.844311	40.721319	-7
1	2010-01-05 16:52:16.0000002	16.9	2010-01-05 16:52:16	-74.016048	40.711303	-7

```
In [240]: print(df.corrwith(train_df['fare_amount']))
```

```
fare_amount           1.000000
pickup_longitude      0.380484
pickup_latitude      -0.189488
dropoff_longitude     0.290090
dropoff_latitude     -0.158196
passenger_count       0.014383
hour                 -0.019302
year                  0.117216
month                 0.025561
date                  0.001324
day                   0.002705
distance              0.821817
absolute_longitude    0.778014
absolute_latitude     0.643646
e_distance            0.830235
dtype: float64
```

```
In [241]: import seaborn as sns
          import matplotlib.pyplot as plt

          spearman_correlation = df.corr(method='spearman')
          pick_columns=spearman_correlation.nlargest(10, 'fare_amount').index
          correlationmap = np.corrcoef(df[pick_columns].values.T)
          sns.set(font_scale=1.0)
          heatmap = sns.heatmap(correlationmap, cbar=True, annot=True, square=True
          , fmt='.2f', yticklabels=columns_new.values, xticklabels=columns_new.val
          ues)

          plt.show()
```



```
In [243]: X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)
```

In [252]:

```
X = train_df_train.drop('fare_amount',axis=1)
y = y = train_df_train[['fare_amount']]

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)


standard_scaler = StandardScaler().fit(X_train)
rescaled_X_train = standard_scaler.transform(X_train)

from sklearn.ensemble import RandomForestRegressor
rf = RandomForestRegressor()
rf.fit(rescaled_X_train, y_train)
rf_predict = rf.predict(X_test)
#error = np.sqrt(mean_squared_error(y_test,pred))
print(rf_predict)
```

```
/anaconda3/lib/python3.6/site-packages/ipykernel_launcher.py:12: DataCo
nversionWarning: A column-vector y was passed when a 1d array was expec
ted. Please change the shape of y to (n_samples,), for example using ra
vel().
  if sys.path[0] == '':
```

```
[41.45 44.95 44.95 ... 44.95 44.95 41.45]
```

In [246]:

```
train_df_train.shape
```

Out[246]:

```
(979060, 10)
```

In [247]:

```
len(y_test)
```

Out[247]:

```
293718
```

In [248]:

```
len(X_test)
```

Out[248]:

```
293718
```

In [249]:

```
len(rescaled_X_train)
```

Out[249]:

```
685342
```

In [250]:

```
len(y_train)
```

Out[250]:

```
685342
```

In [253]:

```
rf.fit(X, y)
```

```
/anaconda3/lib/python3.6/site-packages/ipykernel_launcher.py:1: DataCon
versionWarning: A column-vector y was passed when a 1d array was expect
ed. Please change the shape of y to (n_samples,), for example using rav
el().
  """Entry point for launching an IPython kernel.
```

Out[253]:

```
RandomForestRegressor(bootstrap=True, criterion='mse', max_depth=None,
           max_features='auto', max_leaf_nodes=None,
           min_impurity_decrease=0.0, min_impurity_split=None,
           min_samples_leaf=1, min_samples_split=2,
           min_weight_fraction_leaf=0.0, n_estimators=10, n_jobs=1,
           oob_score=False, random_state=None, verbose=0, warm_start=Fa
lse)
```

In [254]:

```
rf_predict = rf.predict(X_test)
```

In [255]:

```
print (rf_predict)
```

```
[20.2   3.73  5.35 ...  6.06  4.5  19.26]
```

In [257]:

```
y_train.head(5)
```

Out[257]:

	fare_amount
661423	7.5
918011	16.9
960510	5.7
338825	7.0
991454	11.5

In [261]:

```
for i in range(10):
    print (rf_predict[i])
```

```
20.2
3.7300000000000004
5.35
8.42
7.140000000000001
10.74
10.27
21.883
4.5
9.620000000000001
```

In [262]:
```
y_train.head(10)
```

Out[262]:

	fare_amount
661423	7.5
918011	16.9
960510	5.7
338825	7.0
991454	11.5
954904	8.1
750031	19.3
475327	14.5
974243	7.7
1830	20.0

In [267]:
```
rf_predict = rf.predict(X_test)
error = np.sqrt(mean_squared_error(y_test,rf_predict))
print(error)
```

```
1.6738955465124932
```

In [264]:
```
print(rf_predict)
```

```
[ 8.3   10.2    5.06  ... 55.324 18.7    7.55 ]
```

In [268]:
```
test_df.shape
```

Out[268]:
```
(9914, 9)
```

In [269]:
```
X.shape
```

Out[269]:
```
(979060, 9)
```

In [270]:
```
rf_predict = rf.predict(test_df)
print (rf_predict)
print(pred)
```

```
[ 8.3   10.2    5.06  ... 55.324 18.7    7.55 ]
[[10.40567211]
 [11.1670048 ]
 [ 5.43030812]
 ...
 [49.22548212]
 [20.60224933]
 [ 8.64386011]]
```

In [278]:

```
from sklearn.linear_model import Ridge
ridge = Ridge(alpha=0.1)
ridge.fit(X_train, y_train)
ridge_predict_test = ridge.predict(X_test)
error = np.sqrt(mean_squared_error(y_test,ridge_predict_test))
print(error)
print(ridge_predict_test)


ridge.fit(X, y)
ridge_predict=ridge.predict(test_df)
print(ridge_predict)
```

```
5.125687978892424
[[17.61463391]
 [ 6.27831087]
 [ 6.51227483]
 ...
 [ 8.14029401]
 [ 5.602278  ]
 [17.59841975]]
[[10.41173641]
 [11.16332172]
 [ 5.42224178]
 ...
 [49.09186726]
 [20.72469083]
 [ 8.61227372]]
```

In [274]:

```
submission['fare_amount'] = rf_predict
submission.to_csv('submission_3.csv', index=False)
submission.head(20)
```

Out[274]:

	key	fare_amount
0	2015-01-27 13:08:24.0000002	8.300
1	2015-01-27 13:08:24.0000003	10.200
2	2011-10-08 11:53:44.0000002	5.060
3	2012-12-01 21:12:12.0000002	7.650
4	2012-12-01 21:12:12.0000003	14.620
5	2012-12-01 21:12:12.0000005	9.800
6	2011-10-06 12:10:20.0000001	4.820
7	2011-10-06 12:10:20.0000003	48.360
8	2011-10-06 12:10:20.0000002	10.420
9	2014-02-18 15:22:20.0000002	6.150
10	2014-02-18 15:22:20.0000003	9.500
11	2014-02-18 15:22:20.0000001	15.400
12	2010-03-29 20:20:32.0000002	4.020
13	2010-03-29 20:20:32.0000001	7.940
14	2011-10-06 03:59:12.0000002	8.840
15	2011-10-06 03:59:12.0000001	19.454
16	2012-07-15 16:45:04.0000006	9.000
17	2012-07-15 16:45:04.0000002	8.640
18	2012-07-15 16:45:04.0000003	5.290
19	2012-07-15 16:45:04.0000004	4.650

In [279]:

```
submission['fare_amount'] = ridge_predict
submission.to_csv('submission_4.csv', index=False)
submission.head(20)
```

Out[279]:

	key	fare_amount
0	2015-01-27 13:08:24.0000002	10.411736
1	2015-01-27 13:08:24.0000003	11.163322
2	2011-10-08 11:53:44.0000002	5.422242
3	2012-12-01 21:12:12.0000002	7.884502
4	2012-12-01 21:12:12.0000003	13.716213
5	2012-12-01 21:12:12.0000005	10.329417
6	2011-10-06 12:10:20.0000001	6.287167
7	2011-10-06 12:10:20.0000003	50.044504
8	2011-10-06 12:10:20.0000002	11.622250
9	2014-02-18 15:22:20.0000002	7.750008
10	2014-02-18 15:22:20.0000003	10.200876
11	2014-02-18 15:22:20.0000001	15.134557
12	2010-03-29 20:20:32.0000002	5.324779
13	2010-03-29 20:20:32.0000001	8.051190
14	2011-10-06 03:59:12.0000002	9.152499
15	2011-10-06 03:59:12.0000001	13.007124
16	2012-07-15 16:45:04.0000006	5.820099
17	2012-07-15 16:45:04.0000002	9.071017
18	2012-07-15 16:45:04.0000003	6.149045
19	2012-07-15 16:45:04.0000004	5.932387

In [281]:

```
from sklearn.linear_model import Lasso
lassoreg = Lasso(alpha=0.1,normalize=True, max_iter=1e5)

lassoreg.fit(X_train, y_train)
lassoreg_predict_test = ridge.predict(X_test)
error_lasso = np.sqrt(mean_squared_error(y_test,lassoreg_predict_test))
print(error_lasso)
print(lassoreg_predict_test)


ridge.fit(X, y)
lassoreg_predict=ridge.predict(test_df)
print(lassoreg_predict)
```

```
5.125332979742834
[[17.59400102]
 [ 6.26921835]
 [ 6.51012099]
 ...
 [ 8.14375733]
 [ 5.59645646]
 [17.60968464]]
[[10.41173641]
 [11.16332172]
 [ 5.42224178]
 ...
 [49.09186726]
 [20.72469083]
 [ 8.61227372]]
```

In [282]:
```
submission['fare_amount'] = lassoreg_predict
submission.to_csv('submission_5.csv', index=False)
submission.head(20)
```

Out[282]:

	key	fare_amount
0	2015-01-27 13:08:24.0000002	10.411736
1	2015-01-27 13:08:24.0000003	11.163322
2	2011-10-08 11:53:44.0000002	5.422242
3	2012-12-01 21:12:12.0000002	7.884502
4	2012-12-01 21:12:12.0000003	13.716213
5	2012-12-01 21:12:12.0000005	10.329417
6	2011-10-06 12:10:20.0000001	6.287167
7	2011-10-06 12:10:20.0000003	50.044504
8	2011-10-06 12:10:20.0000002	11.622250
9	2014-02-18 15:22:20.0000002	7.750008
10	2014-02-18 15:22:20.0000003	10.200876
11	2014-02-18 15:22:20.0000001	15.134557
12	2010-03-29 20:20:32.0000002	5.324779
13	2010-03-29 20:20:32.0000001	8.051190
14	2011-10-06 03:59:12.0000002	9.152499
15	2011-10-06 03:59:12.0000001	13.007124
16	2012-07-15 16:45:04.0000006	5.820099
17	2012-07-15 16:45:04.0000002	9.071017
18	2012-07-15 16:45:04.0000003	6.149045
19	2012-07-15 16:45:04.0000004	5.932387

In [283]:
```
train_df.head(2)
```

Out[283]:

	key	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dr
0	2009-06-15 17:26:21.0000001	4.5	2009-06-15 17:26:21	-73.844311	40.721319	-7
1	2010-01-05 16:52:16.0000002	16.9	2010-01-05 16:52:16	-74.016048	40.711303	-7

In [1]:
```
from sklearn.neural_network import MLPClassifier
```

In [2]:

```
mlp = MLPClassifier(hidden_layer_sizes=(13,13,13),max_iter=500)
```