In [21]:
```
import pandas as pd
import numpy as np
from ggplot import *
```

In [22]:
```
# read input data - version 2
df2 = pd.read_csv("turnstile_weather_v2.csv", parse_dates=['datetime']
)
# the original data
df = pd.read_csv('turnstile_data_master_with_weather.csv')
df2.head()
```

Out[22]:

	UNIT	DATEn	TIMEn	ENTRIESn	EXITSn	ENTRIESn_hourly	EXITSn_hourly	datet
0	R003	05-01-11	00:00:00	4388333	2911002	0	0	2011 01 00:0
1	R003	05-01-11	04:00:00	4388333	2911002	0	0	2011 01 04:0
2	R003	05-01-11	12:00:00	4388333	2911002	0	0	2011 01 12:0
3	R003	05-01-11	16:00:00	4388333	2911002	0	0	2011 01 16:0
4	R003	05-01-11	20:00:00	4388333	2911002	0	0	2011 01 20:0

5 rows × 27 columns

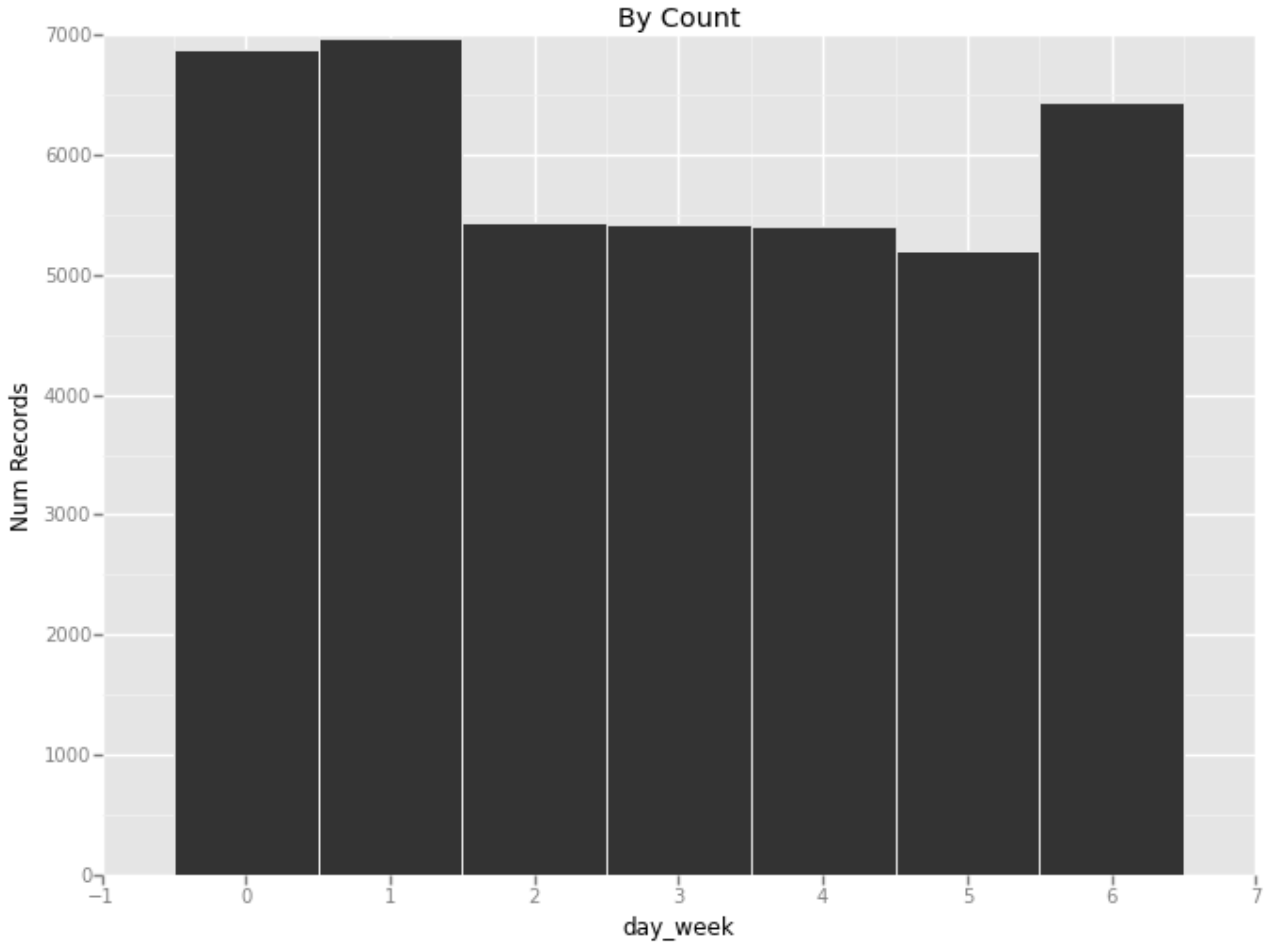
In [3]:
```
df2.describe()
```

Out[3]:

	ENTRIESn	EXITSn	ENTRIESn_hourly	EXITSn_hourly	hour	d
count	4.264900e+04	4.264900e+04	42649.000000	42649.000000	42649.000000	4
mean	2.812486e+07	1.986993e+07	1886.589955	1361.487866	10.046754	2
std	3.043607e+07	2.028986e+07	2952.385585	2183.845409	6.938928	2
min	0.000000e+00	0.000000e+00	0.000000	0.000000	0.000000	0
25%	1.039762e+07	7.613712e+06	274.000000	237.000000	4.000000	1
50%	1.818389e+07	1.331609e+07	905.000000	664.000000	12.000000	3
75%	3.263049e+07	2.393771e+07	2255.000000	1537.000000	16.000000	5
max	2.357746e+08	1.493782e+08	32814.000000	34828.000000	20.000000	6

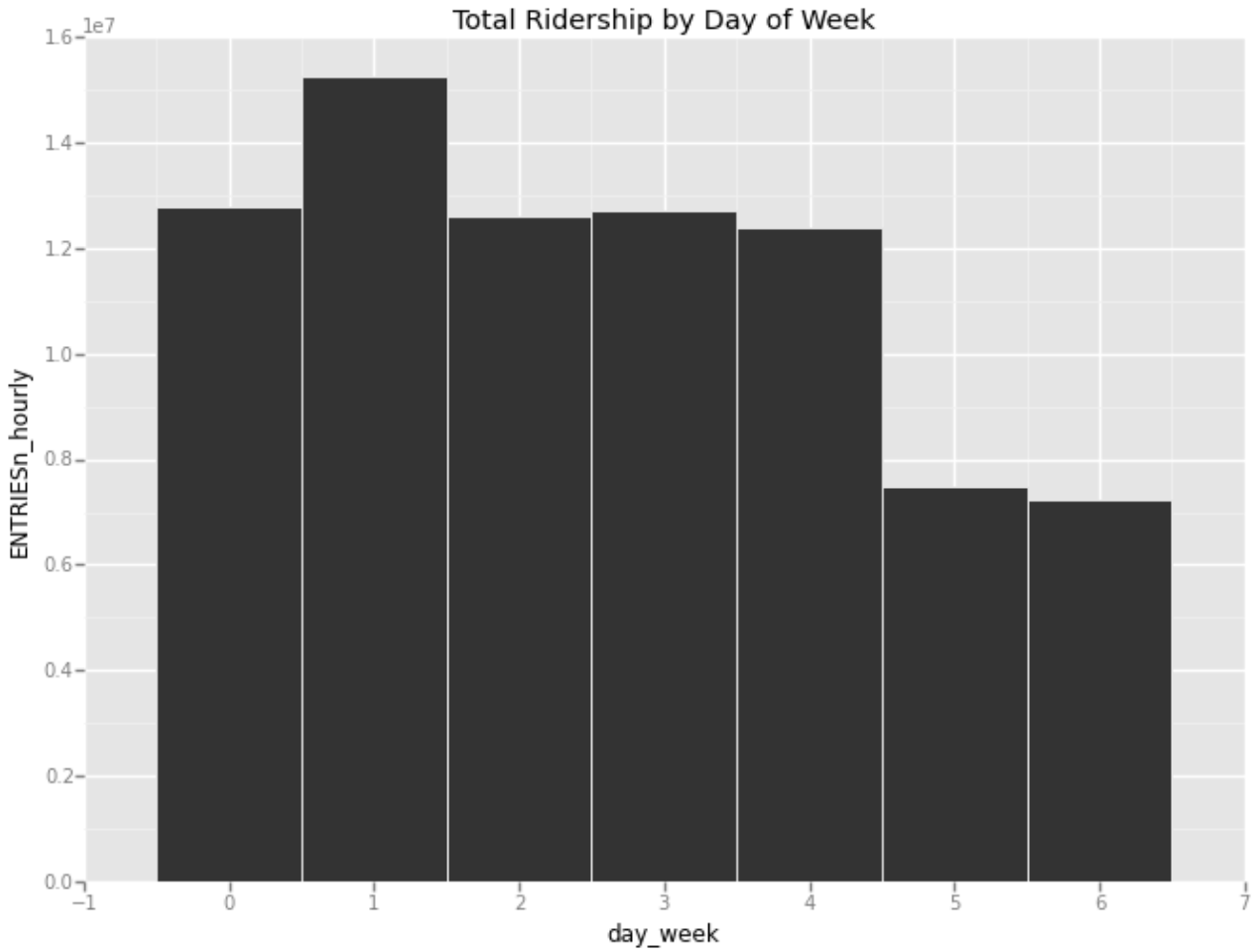
8 rows × 21 columns

In [23]:
```
# distribution of data by day of week
#ggplot(aes(x='day_week'), data=df2) + geom_histogram(binwidth=1) # no
te this is lumping last bin in with second to last
day_count = df2[['day_week', 'ENTRIESn_hourly']].groupby('day_week', a
s_index=False).aggregate(np.count_nonzero)
ggplot(aes(x='day_week', y='ENTRIESn_hourly'), data=day_count) + geom_
bar(stat='identity') + labs(title='By Count') + ylab('Num Records')
```



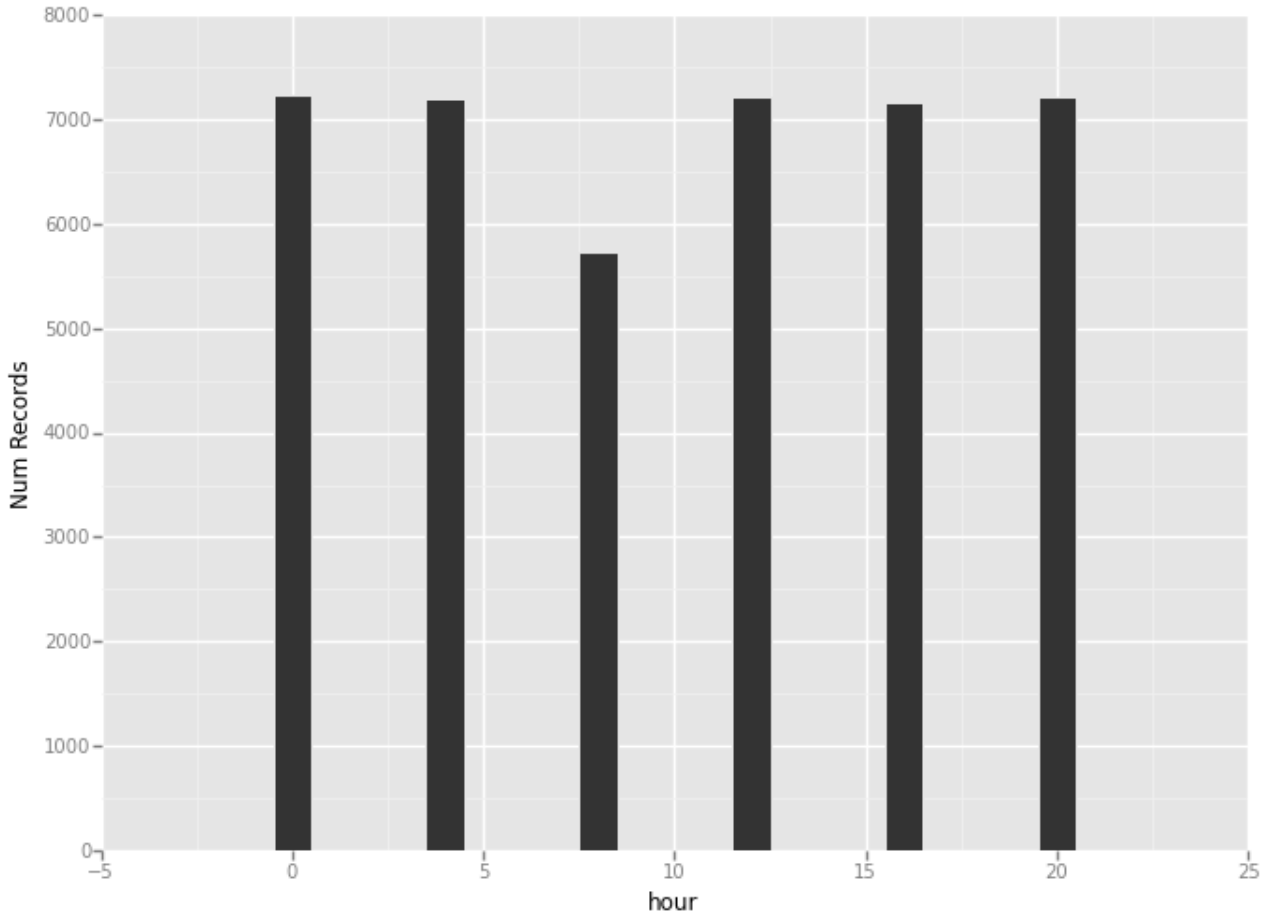
Out[23]: <ggplot: (8786090933501)>

In [24]:
```
day_sum = df2[['day_week', 'ENTRIESn_hourly']].groupby('day_week', as_
index=False).aggregate(np.sum)
ggplot(aes(x='day_week', y='ENTRIESn_hourly'), data=day_sum) + geom_ba
r(stat='identity') + labs(title='Total Ridership by Day of Week')
```



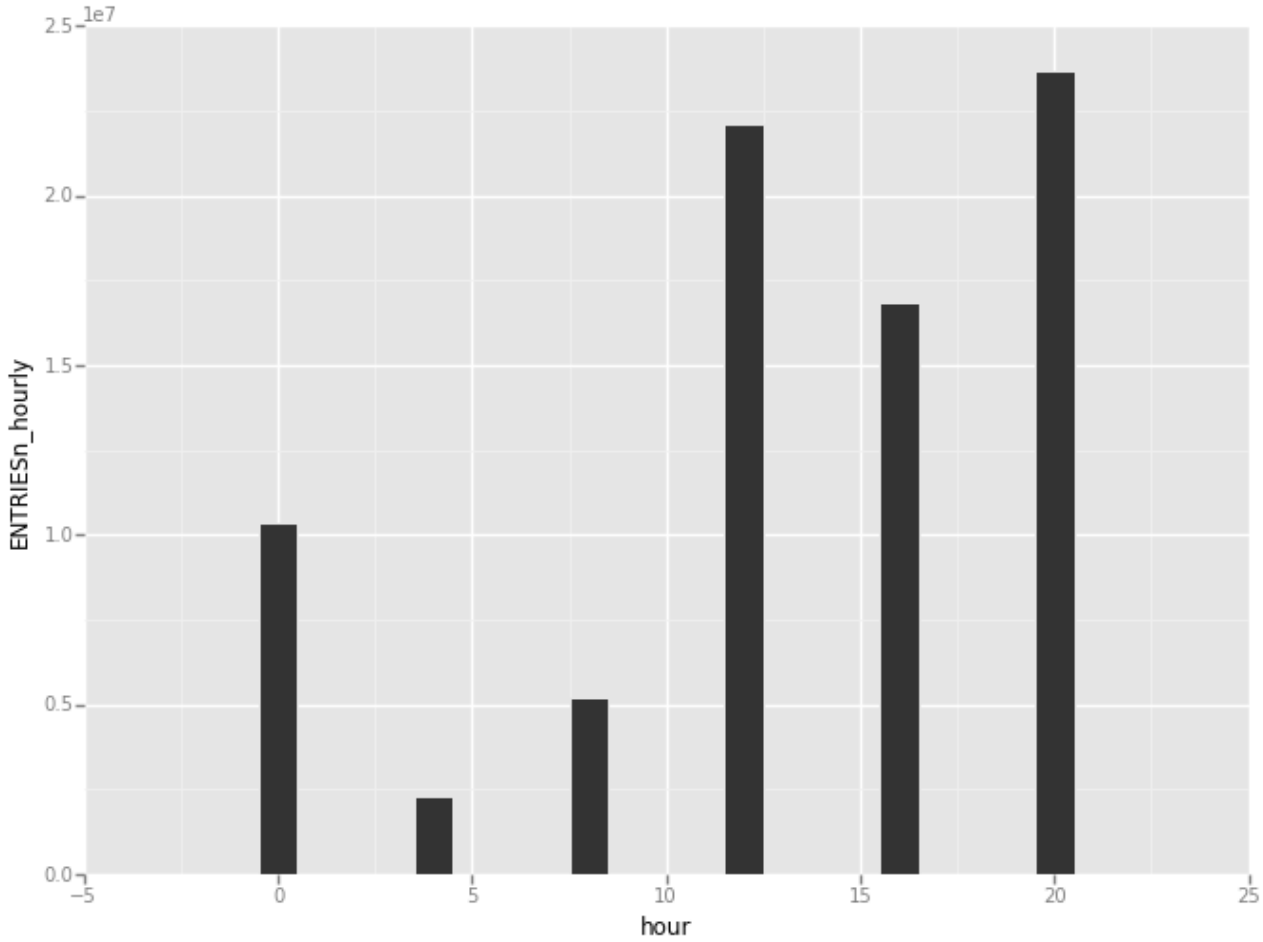
Out[24]: <ggplot: (8786094274009)>

In [25]:
```
# distribution of data by hour
hour_count = df2[['hour', 'ENTRIESn_hourly']].groupby('hour', as_index
=False).aggregate(np.count_nonzero)
#ggplot(aes(x='hour'), data=df2) + geom_histogram(binwidth=1) # last b
in is being included with next to last bin
ggplot(aes(x='hour', y='ENTRIESn_hourly'), data=hour_count) + geom_bar
(stat='identity') + ylab('Num Records')
```



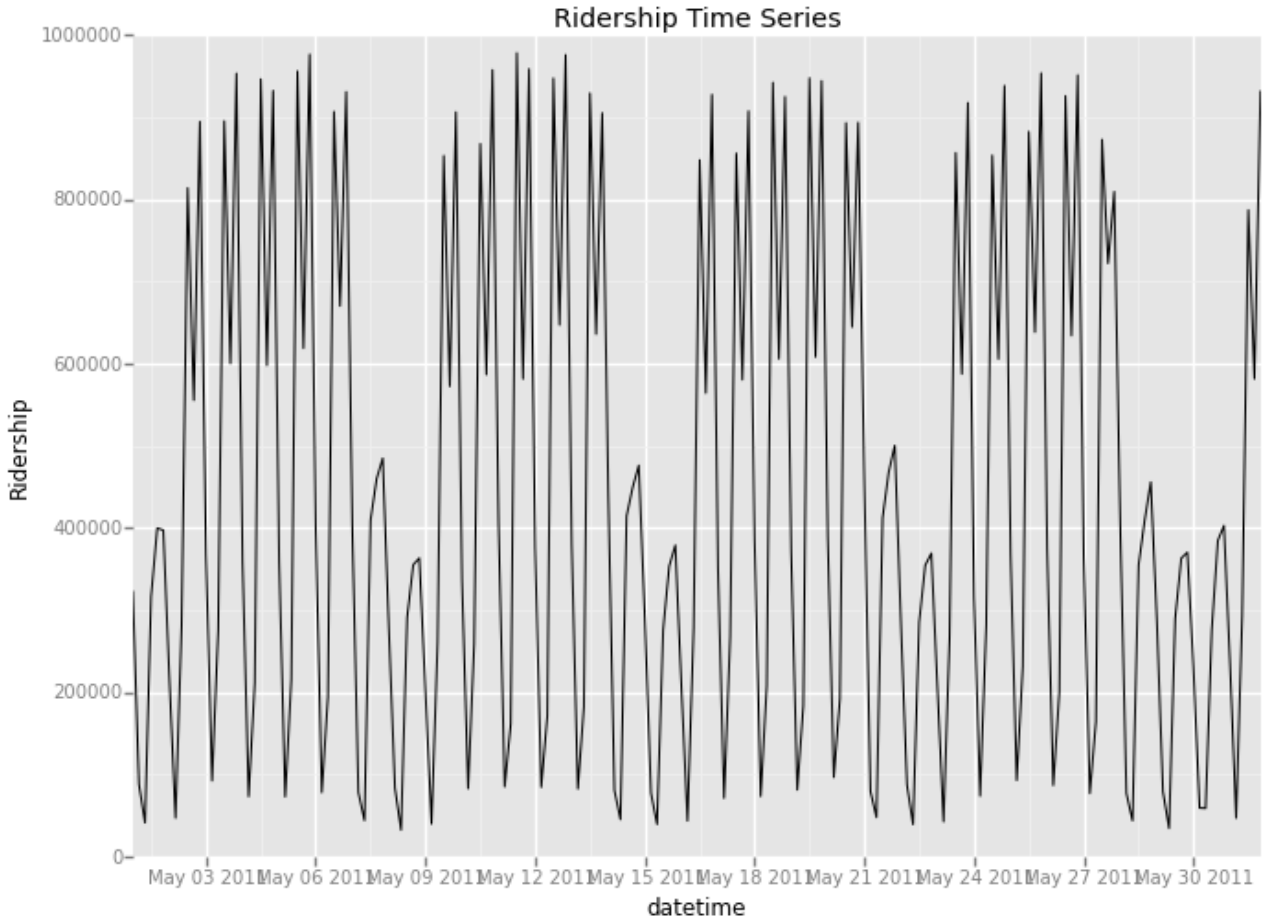
Out[25]: <ggplot: (8786094427405)>

In [26]:
```
hour_sum = df2[['hour', 'ENTRIESn_hourly']].groupby('hour', as_index=False).aggregate(np.sum)
ggplot(aes(x='hour', y='ENTRIESn_hourly'), data=hour_sum) + geom_bar(stat='identity')
```



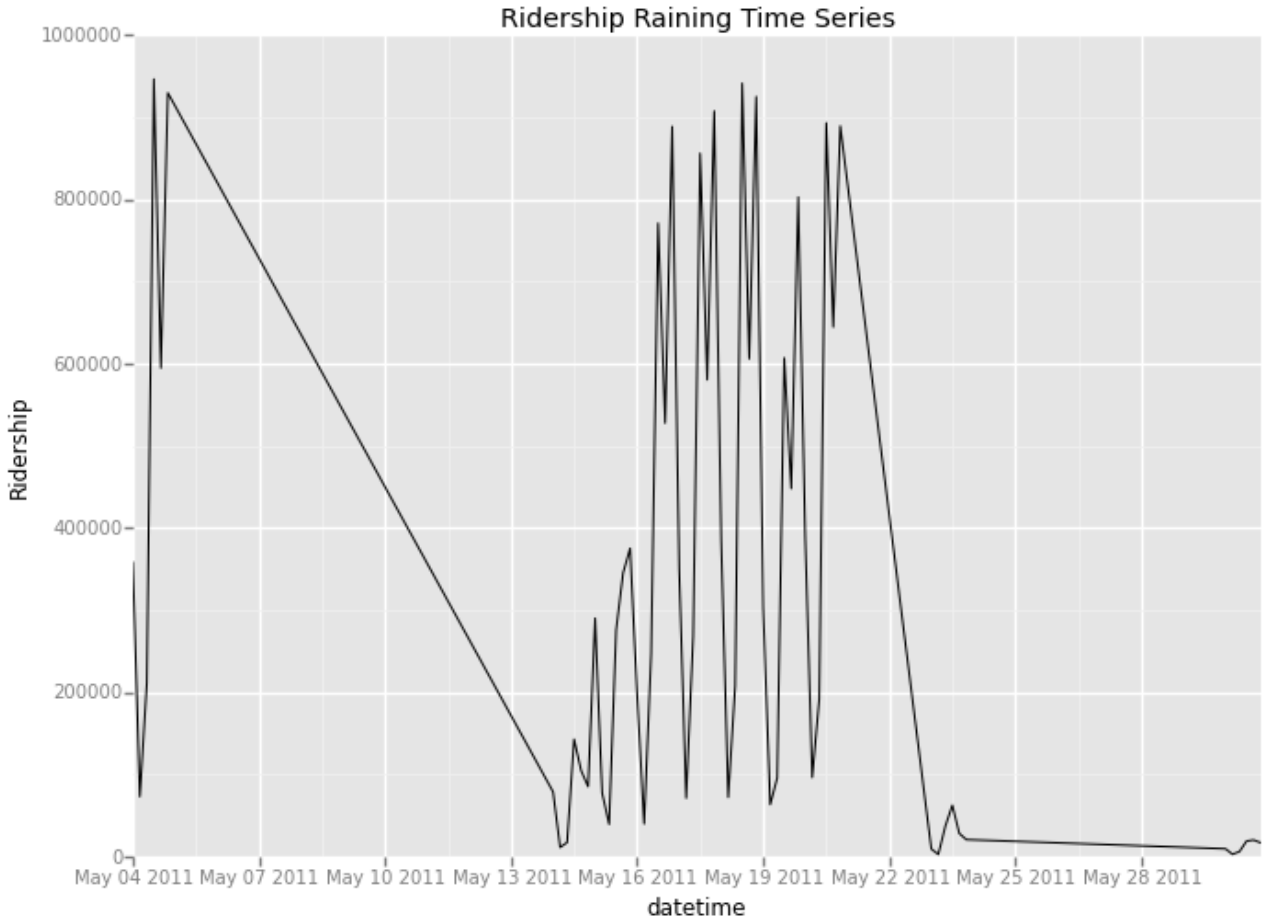
Out[26]: <ggplot: (8786094427469)>

In [27]:
```
# let's plot as time series
# plotting the time series allows to spot gaps and outliers too
time_series = df2[['datetime', 'ENTRIESn_hourly']].groupby('datetime',
 as_index=False).aggregate(np.sum)
time_series.reset_index()
ggplot(aes(x='datetime', y='ENTRIESn_hourly'), data=time_series) + geo
m_line() + ylab('Ridership') + labs(title='Ridership Time Series')
```



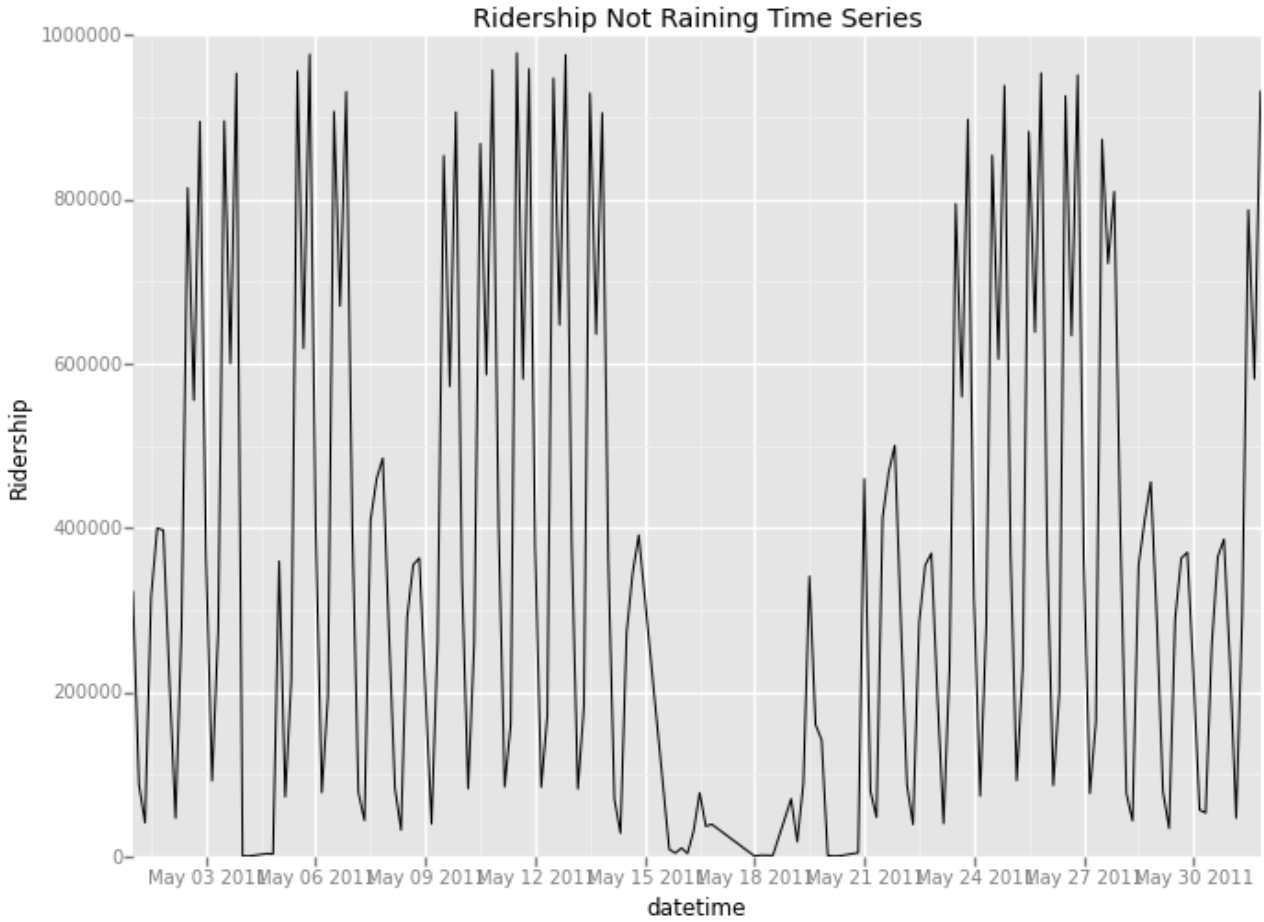
Out[27]: <ggplot: (8786094272473)>

In [28]:
```
rain = df2[df2['rain'] == 1]
time_series_rain = rain[['datetime', 'ENTRIESn_hourly']].groupby('date
time', as_index=False).aggregate(np.sum)
time_series_rain.reset_index()
ggplot(aes(x='datetime', y='ENTRIESn_hourly'), data=time_series_rain)
+ geom_line() + ylab('Ridership') + labs(title='Ridership Raining Time
 Series')
```



Out[28]: <ggplot: (8786094002309)>

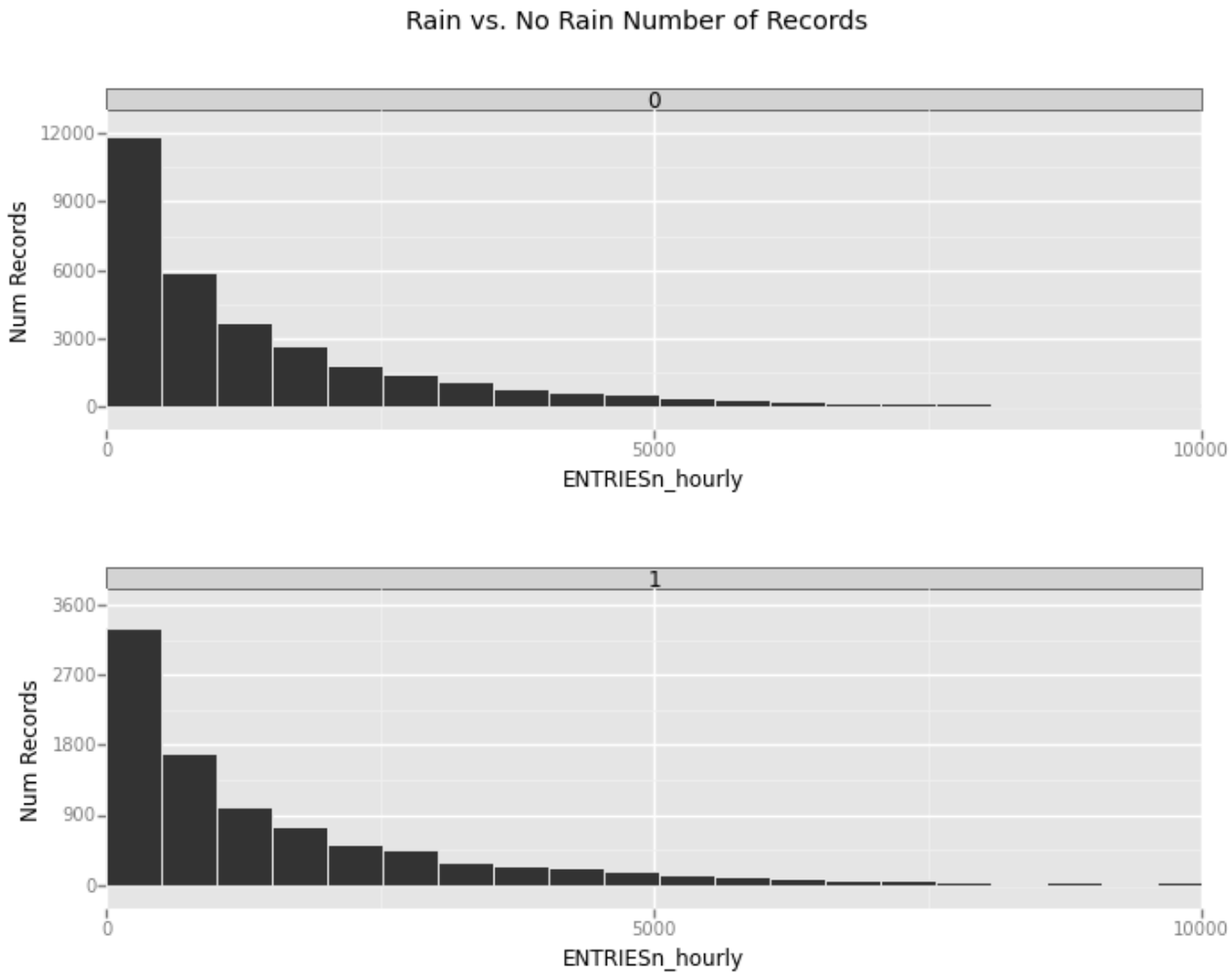
In [31]:
```
norain = df2[df2['rain'] == 0]
time_series_norain = norain[['datetime', 'ENTRIESn_hourly']].groupby('
datetime', as_index=False).aggregate(np.sum)
time_series_norain.reset_index()
ggplot(aes(x='datetime', y='ENTRIESn_hourly'), data=time_series_norain
) + geom_line() + ylab('Ridership') + labs(title='Ridership Not Rainin
g Time Series')
```



Out[31]: <ggplot: (8786092303173)>

In [9]:
```
ggplot(aes(x='ENTRIESn_hourly'), data=df2) + geom_histogram(binwidth=5
00) + scale_x_continuous(limits=(0, 10000)) +\
facet_wrap('rain') + ylab('Num Records') + labs(title='Rain vs. No Rai
n Number of Records')
```

```
/home/jay/anaconda/lib/python2.7/site-packages/ggplot/ggplot.py:200: R
untimeWarning: Facetting is currently not supported with geom_bar. See
                    https://github.com/yhat/ggplot/issues/196 for more
 information
  warnings.warn(msg, RuntimeWarning)
/home/jay/anaconda/lib/python2.7/site-packages/pandas/util/decorators.
py:81: FutureWarning: the 'rows' keyword is deprecated, use 'index' in
stead
  warnings.warn(msg, FutureWarning)
/home/jay/anaconda/lib/python2.7/site-packages/ggplot/geoms/geom_bar.p
y:47: FutureWarning: comparison to `None` will result in an elementwis
e object comparison in the future.
  _reset = self.bottom == None or (self.ax != None and self.ax != ax)
```




```
Out[9]: <ggplot: (8786094360153)>
```

In [10]:
```
sum_rain = df2[['rain', 'ENTRIESn_hourly']].groupby('rain', as_index=F
alse).aggregate(np.sum)
#ggplot(aes(x='ENTRIESn_hourly'), data=sum_rain) + geom_histogram(binw
idth=500) + scale_x_continuous(limits=(0, 10000)) +\
#facet_wrap('rain') + ylab('Ridership') + labs(title='Rain vs. No Rain
 Ridership')
sum_rain
```

Out[10]:

	rain	ENTRIESn_hourly
0	0	61020916
1	1	19440259

In [41]:
```
rain = df2[df2['rain'] == 1]['ENTRIESn_hourly']
rain.describe()
```

Out[41]:
```
count     9585.000000
mean      2028.196035
std       3189.433373
min          0.000000
25%        295.000000
50%        939.000000
75%       2424.000000
max      32289.000000
Name: ENTRIESn_hourly, dtype: float64
```

In [42]:
```
norain = df2[df2['rain'] == 0]['ENTRIESn_hourly']
norain.describe()
```

Out[42]:
```
count    33064.000000
mean      1845.539439
std       2878.770848
min          0.000000
25%        269.000000
50%        893.000000
75%       2197.000000
max      32814.000000
Name: ENTRIESn_hourly, dtype: float64
```

In [43]:
```
print rain.mean() - norain.mean()
print rain.median() - norain.median()
```

```
182.656596808
46.0
```

In []:
```
```