In [1]:

```
## Airline Passengers Forecasting Using FbProphet

import pandas as pd
import fbprophet
import matplotlib.pyplot as plt
%matplotlib inline
```

In [3]:

```
df=pd.read_csv('/content/airline_passengers.csv')
```

In [4]:

```
df.head()
```

Out[4]:

	Month	Thousands of Passengers
0	1949-01	112.0
1	1949-02	118.0
2	1949-03	132.0
3	1949-04	129.0
4	1949-05	121.0

In [5]:

```
df.tail()
```

Out[5]:

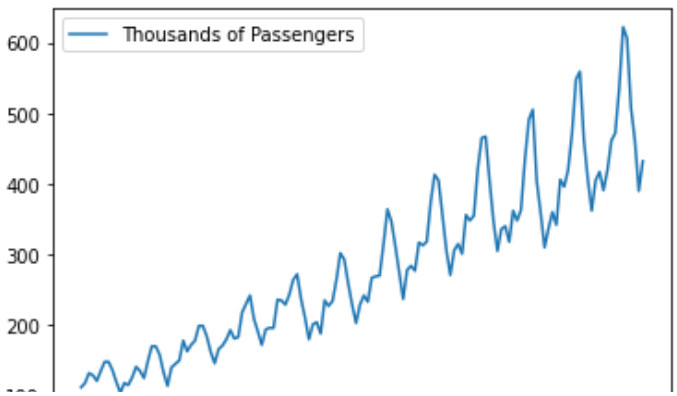
	Month	Thousands of Passengers
140	1960-09	508.0
141	1960-10	461.0
142	1960-11	390.0
143	1960-12	432.0
144	International airline passengers: monthly tota...	NaN

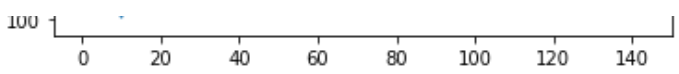
In [7]:

```
df.plot()
```

Out[7]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f05d9f32210>
```





In [8]:

```
df.columns = ['ds','y']
df.head()
```

Out[8]:

	ds	y
0	1949-01	112.0
1	1949-02	118.0
2	1949-03	132.0
3	1949-04	129.0
4	1949-05	121.0

In [9]:

```
df.drop(144,axis=0,inplace=True)
```

In [10]:

```
df.tail()
```

Out[10]:

	ds	y
139	1960-08	606.0
140	1960-09	508.0
141	1960-10	461.0
142	1960-11	390.0
143	1960-12	432.0

In [11]:

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

In [12]:

```
df.head()
```

Out[12]:

	ds	y
0	1949-01-01	112.0
1	1949-02-01	118.0
2	1949-03-01	132.0
3	1949-04-01	129.0
4	1949-05-01	121.0

In [13]:

```
df.tail()
```

Out[13]:

	ds	y
139	1960-08-01	606.0

	ds	y
140	1960-09-01	508.0
141	1960-10-01	461.0
142	1960-11-01	390.0
143	1960-12-01	432.0

In [14]:

```
from fbprophet import Prophet
```

In [15]:

```
dir(Prophet)
```

Out[15]:

```
['__class__',
 '__delattr__',
 '__dict__',
 '__dir__',
 '__doc__',
 '__eq__',
 '__format__',
 '__ge__',
 '__getattribute__',
 '__gt__',
 '__hash__',
 '__init__',
 '__init_subclass__',
 '__le__',
 '__lt__',
 '__module__',
 '__ne__',
 '__new__',
 '__reduce__',
 '__reduce_ex__',
 '__repr__',
 '__setattr__',
 '__sizeof__',
 '__str__',
 '__subclasshook__',
 '__weakref__',
 '_load_stan_backend',
 'add_country_holidays',
 'add_group_component',
 'add_regressor',
 'add_seasonality',
 'construct_holiday_dataframe',
 'fit',
 'flat_growth_init',
 'flat_trend',
 'fourier_series',
 'initialize_scales',
 'linear_growth_init',
 'logistic_growth_init',
 'make_all_seasonality_features',
 'make_future_dataframe',
 'make_holiday_features',
 'make_seasonality_features',
 'parse_seasonality_args',
 'percentile',
 'piecewise_linear',
 'piecewise_logistic',
 'plot',
 'plot_components',
 'predict',
 'predict_seasonal_components',
 'predict_trend',
 'predict_uncertainty',
 'predictive_samples',
```

```
 'regressor_column_matrix',
 'sample_model',
 'sample_posterior_predictive',
 'sample_predictive_trend',
 'set_auto_seasonalities',
 'set_changepoints',
 'setup_dataframe',
 'validate_column_name',
 'validate_inputs']
```

In [16]:

```
# Initialize the Model
model=Prophet()
```

In [17]:

```
df.columns
```

Out[17]:

```
Index(['ds', 'y'], dtype='object')
```

In [18]:

```
df.dropna(axis=0,inplace=True)
```

```
INFO:numexpr.utils:NumExpr defaulting to 2 threads.
```

In [19]:

```
df.head()
```

Out[19]:

	ds	y
0	**1949-01-01**	**112.0**
1	**1949-02-01**	**118.0**
2	**1949-03-01**	**132.0**
3	**1949-04-01**	**129.0**
4	**1949-05-01**	**121.0**

In [20]:

```
model.fit(df)
```

```
INFO:fbprophet:Disabling weekly seasonality. Run prophet with weekly_seasonality=True to
override this.
INFO:fbprophet:Disabling daily seasonality. Run prophet with daily_seasonality=True to ov
erride this.
```

Out[20]:

```
<fbprophet.forecaster.Prophet at 0x7f05d9a00410>
```

In [21]:

```
df.tail()
```

Out[21]:

	ds	y
139	**1960-08-01**	**606.0**
140	**1960-09-01**	**508.0**
141	**1960-10-01**	**461.0**
142	**1960-11-01**	**390.0**

	ds	y
143	1960-12-01	432.0

In [22]:

```
### Create future dates of 365 days
future_dates=model.make_future_dataframe(periods=365)
```

In [23]:

```
future_dates.tail()
```

Out[23]:

	ds
504	1961-11-27
505	1961-11-28
506	1961-11-29
507	1961-11-30
508	1961-12-01

In [24]:

```
prediction=model.predict(future_dates)
```

In [25]:

```
prediction.head()
```

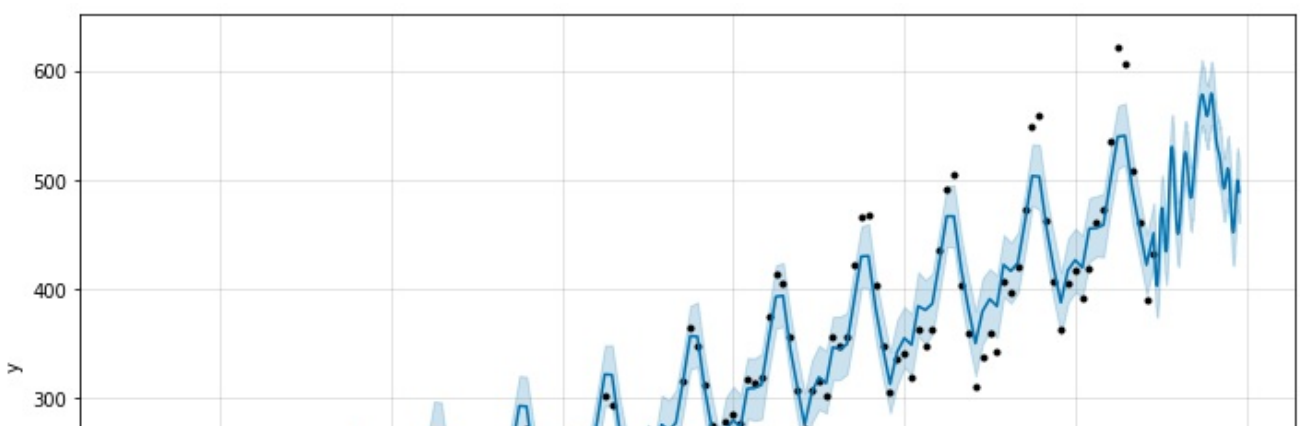
Out[25]:

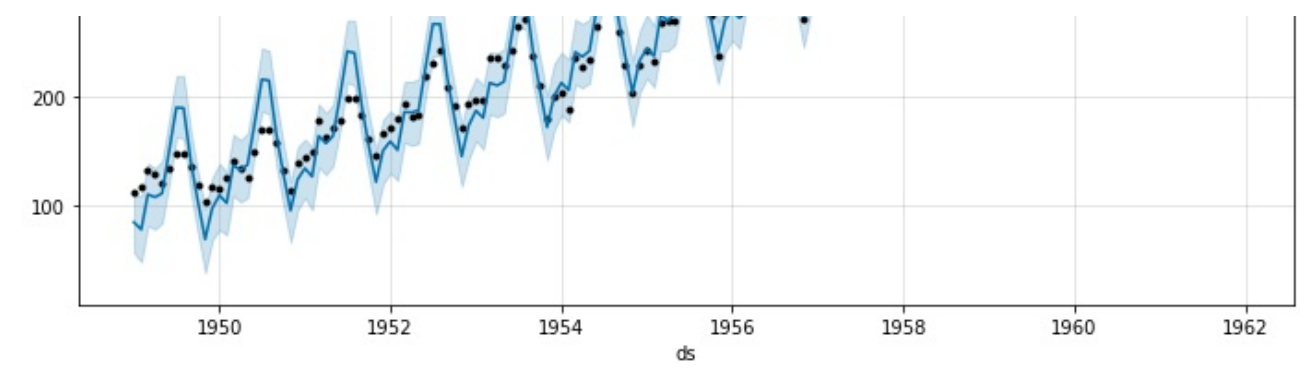
	ds	trend	yhat_lower	yhat_upper	trend_lower	trend_upper	additive_terms	additive_terms_lower	additive_terms_u
0	1949-01-01	106.727984	56.578938	110.369495	106.727984	106.727984	-21.920631	-21.920631	-21.92
1	1949-02-01	108.901201	48.320578	109.039991	108.901201	108.901201	-30.682847	-30.682847	-30.68
2	1949-03-01	110.864107	81.549103	138.690395	110.864107	110.864107	-0.502710	-0.502710	-0.50
3	1949-04-01	113.037323	78.395219	134.615024	113.037323	113.037323	-5.185501	-5.185501	-5.18
4	1949-05-01	115.140437	84.207209	141.213038	115.140437	115.140437	-3.788702	-3.788702	-3.78

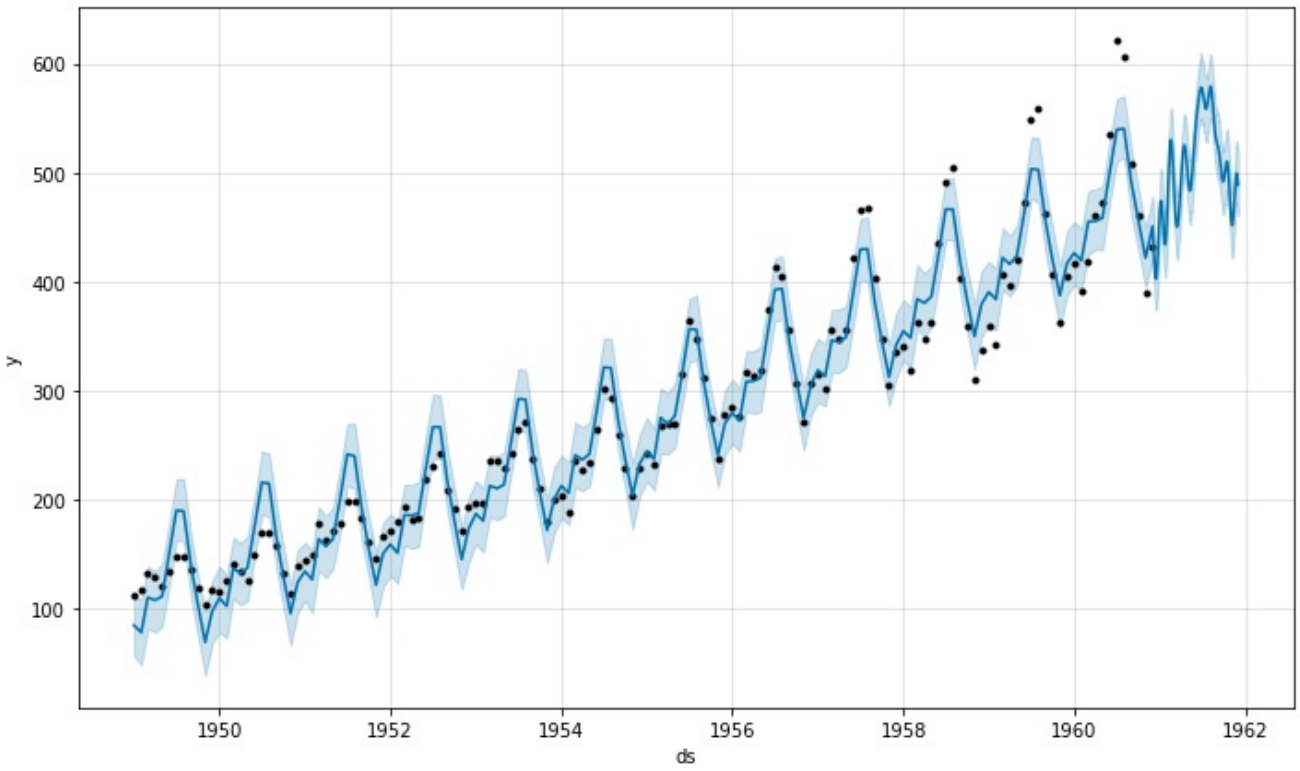
In [26]:

```
### plot the predicted projection
model.plot(prediction)
```

Out[26]:



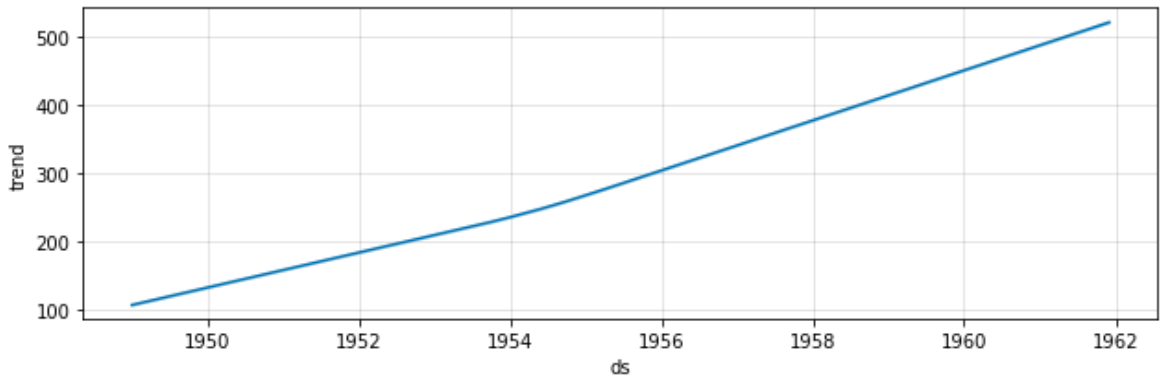


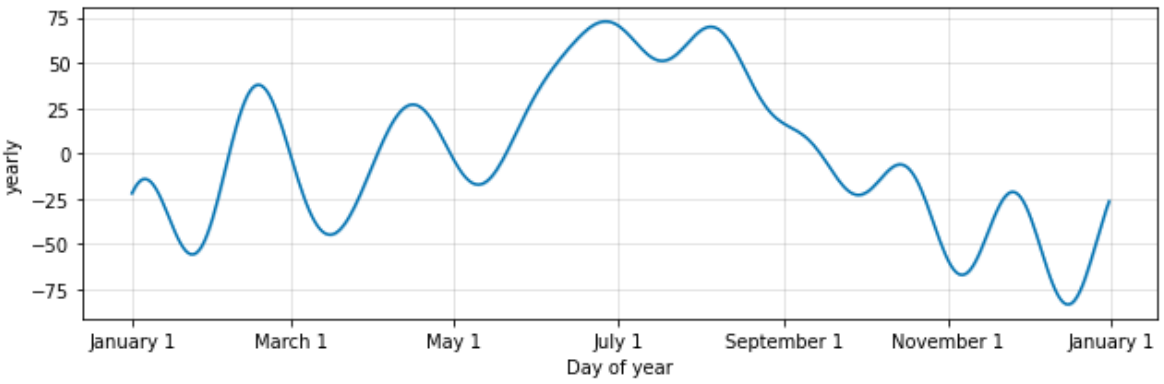


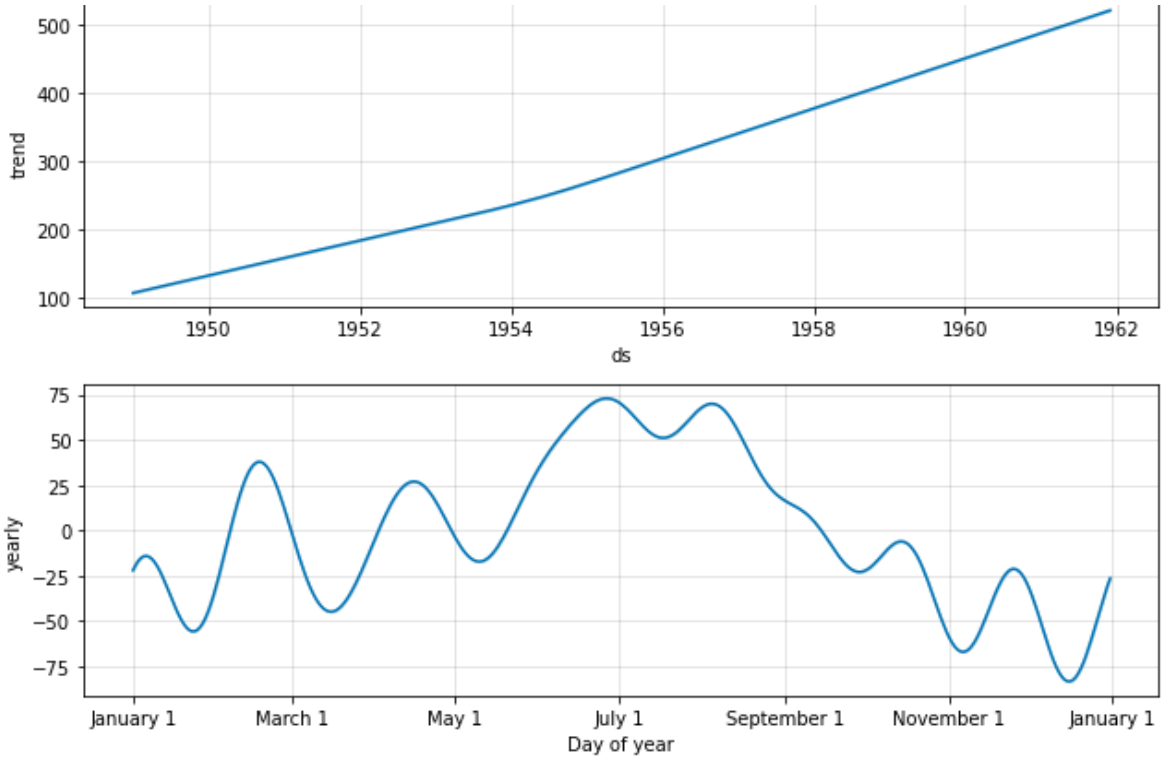
In [29]:

```
#### Visualize Each Components[Trends,yearly]
model.plot_components(prediction)
```

Out[29]:







In [30]:

```
df.head()
```

Out[30]:

	ds	y
0	1949-01-01	112.0
1	1949-02-01	118.0
2	1949-03-01	132.0
3	1949-04-01	129.0
4	1949-05-01	121.0

In [31]:

```
from fbprophet.diagnostics import cross_validation
df_cv = cross_validation(model, initial='730 days', period='180 days', horizon = '365 da
ys')
df_cv.head()
```

```
INFO:fbprophet:Making 19 forecasts with cutoffs between 1951-01-18 00:00:00 and 1959-12-0
2 00:00:00
```

```
INFO:fbprophet:n_changepoints greater than number of observations. Using 19.
INFO:fbprophet:n_changepoints greater than number of observations. Using 23.
```

Out[31]:

	ds	yhat	yhat_lower	yhat_upper	y	cutoff
0	1951-02-01	158.013969	157.798379	158.230357	150.0	1951-01-18
1	1951-03-01	171.224502	170.530372	171.935670	178.0	1951-01-18
2	1951-04-01	159.628157	158.215258	161.056428	163.0	1951-01-18
3	1951-05-01	145.666500	143.483629	147.909767	172.0	1951-01-18
4	1951-06-01	180.679910	177.532311	183.900682	178.0	1951-01-18

In [32]:

```
from fbprophet.diagnostics import performance_metrics
```

```
df_p = performance_metrics(df_cv)
df_p.head()
```

Out[32]:

	horizon	mse	rmse	mae	mape	mdape	coverage
0	40 days	1083.476338	32.916202	25.895616	0.078758	0.073725	0.227273
1	42 days	1009.201759	31.767936	25.246674	0.077080	0.073725	0.181818
2	46 days	906.510734	30.108317	24.749820	0.079413	0.084057	0.136364
3	47 days	1039.076713	32.234713	26.867165	0.082299	0.085796	0.136364
4	48 days	1027.847500	32.060061	26.277771	0.080195	0.085796	0.181818

In [33]:

```
df_p.head()
```

Out[33]:

	horizon	mse	rmse	mae	mape	mdape	coverage
0	40 days	1083.476338	32.916202	25.895616	0.078758	0.073725	0.227273
1	42 days	1009.201759	31.767936	25.246674	0.077080	0.073725	0.181818
2	46 days	906.510734	30.108317	24.749820	0.079413	0.084057	0.136364
3	47 days	1039.076713	32.234713	26.867165	0.082299	0.085796	0.136364
4	48 days	1027.847500	32.060061	26.277771	0.080195	0.085796	0.181818

In [34]:

```
from fbprophet.plot import plot_cross_validation_metric
fig = plot_cross_validation_metric(df_cv, metric='rmse')
```