In [1]:
```python
import pandas as pd
import sklearn
import numpy as np
```

In [2]:
```python
#read in data
pd.set_option('display.max_columns', None)
p = pd.read_csv("personality_train.csv")
p
```

Out[2]:

	#AUTHID	STATUS	sEXT	sNEU	sAGR	sCON	sOPN	cEXT	cNEU	cAGR	cCON	cOPN	DATE	NETWORK
0	ecbddbfe00e0f83cfdb802a7186061c7	is stuck on Band-Aid brand, cuz Band-Aid's stu...	4.30	2.15	3.60	3.30	4.10	y	n	y	n	y	12/31/09 10:42 PM	
1	b7b7764cfa1c523e4e93ab2a79a946c4	likes the sound of thunder.	2.65	3.00	3.15	3.25	4.40	n	y	n	n	y	12/25/09 06:18 PM	
2	db39f7b2aad360b1033ec1f8fcd57f9c	Back from vacation and tired	4.65	3.20	3.05	3.65	4.75	y	y	n	y	y	12/17/09 02:46 PM	
3	4d035bd3fd8d9595d15cea9e388964be	had a great day at church...	3.70	2.90	3.40	3.35	4.05	y	y	n	n	y	11/20/09 01:35 AM	
4	5489ed38556af050d6a93e5d27b95dfb	fie! Time, Inc. has blocked gchat... does this...	4.15	3.10	3.20	3.60	3.80	y	y	n	y	y	11/15/09 04:16 PM	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
167	a764ca41dca158d7a191505dcc8ce47f	Red	3.70	2.50	4.20	4.10	3.60	y	n	y	y	n	01/12/10 07:48 PM	
168	deb899e426c1a5c66c24eeb0d7df6257	About mornings and winter,and magic.	2.15	2.15	4.10	2.90	4.60	n	n	y	n	y	01/11/10 04:19 AM	
169	ea28a927cb6663480ea33ca917c3c8ba	is wishing it was Saturday.	4.05	3.35	3.80	3.95	4.50	y	y	y	y	y	01/09/10 01:01 AM	
170	5532642937eb3497a43e15dbb23a9d2d	snipers get more head	1.40	4.05	3.30	3.40	3.95	n	y	n	n	y	01/08/10 01:50 AM	
171	a286b7286b1247d4a7851709e9f31e1e	Last night was amazing! Not only did I see *PR...	4.25	3.00	3.25	3.50	4.00	y	y	n	y	y	01/06/10 06:25 PM	

172 rows × 20 columns

In [3]:
```python
#setup features and labels for the tree
#dependent variables (needed for sorting output later)
labels = p['cNEU']
labels
```

Out[3]:
```
0      n
1      y
2      y
3      y
4      y
      ..
167    n
168    n
169    y
170    y
171    y
Name: cNEU, Length: 172, dtype: object
```

In [4]:
```python
#features/independent variables
features = ["NETWORKSIZE","BETWEENNESS","NBETWEENNESS","DENSITY","BROKERAGE","NBROKERAGE","TRA

#features = ["NETWORKSIZE","BETWEENNESS","NBETWEENNESS","DENSITY","BROKERAGE","NBROKERAGE","TRA

#features = ["sEXT","sAGR","sCON","sOPN"]
features
```

Out[4]:
```
['NETWORKSIZE',
 'BETWEENNESS',
 'NBETWEENNESS',
 'DENSITY',
 'BROKERAGE',
 'NBROKERAGE',
 'TRANSITIVITY',
 'sEXT',
 'sAGR',
 'sCON',
 'sOPN']
```

In [5]:
```python
#get dataframe of just features
#get all rows and just the columns that match our features
X = p.loc[:,features]
X
```

Out[5]:

	NETWORKSIZE	BETWEENNESS	NBETWEENNESS	DENSITY	BROKERAGE	NBROKERAGE	TRANSITIVITY	sEXT	sAGR	sCON	sOPN
0	739	267574.00	98.39	0.01	270029	0.50	0.07	4.30	3.60	3.30	4.10
1	180	14861.60	93.29	0.03	15661	0.49	0.10	2.65	3.15	3.25	4.40
2	102	4359.80	86.33	0.09	4668	0.46	0.36	4.65	3.05	3.65	4.75
3	57	1509.50	98.02	0.05	1522	0.49	0.03	3.70	3.40	3.35	4.05
4	950	438219.00	97.42	0.01	445454	0.50	0.09	4.15	3.20	3.60	3.80
...	...	...	...	...	...	...	...	...	...	...	...
167	451	98153.10	97.16	0.02	99733	0.49	0.12	3.70	4.20	4.10	3.60
168	36	185.71	31.21	0.40	377	0.32	0.63	2.15	4.10	2.90	4.60
169	83	2935.76	88.40	0.08	3120	0.47	0.26	4.05	3.80	3.95	4.50
170	154	11424.50	98.25	0.02	11510	0.49	0.05	1.40	3.30	3.40	3.95
171	539	138337.00	95.77	0.02	142460	0.49	0.13	4.25	3.25	3.50	4.00

172 rows × 11 columns

In [6]:
```python
#setup plot for the confusion matrix and decision tree
import matplotlib.pyplot as plt
print(plt.rcParams.get('figure.figsize'))
```

```
[6.0, 4.0]
```

In [7]:
```python
#setup figure size
fig_size = plt.rcParams["figure.figsize"]
fig_size[0] = 20
fig_size[1] = 20
plt.rcParams["figure.figsize"] = fig_size
```

In [8]:
```python
#output/labels once more for naming
Y = p["cNEU"]
Y
```

Out[8]:
```
0      n
1      y
2      y
3      y
4      y
      ..
167    n
168    n
169    y
170    y
171    y
Name: cNEU, Length: 172, dtype: object
```

In [9]:
```python
from sklearn import tree

clf = tree.DecisionTreeClassifier(random_state=0)
clf = clf.fit(X, Y)
```

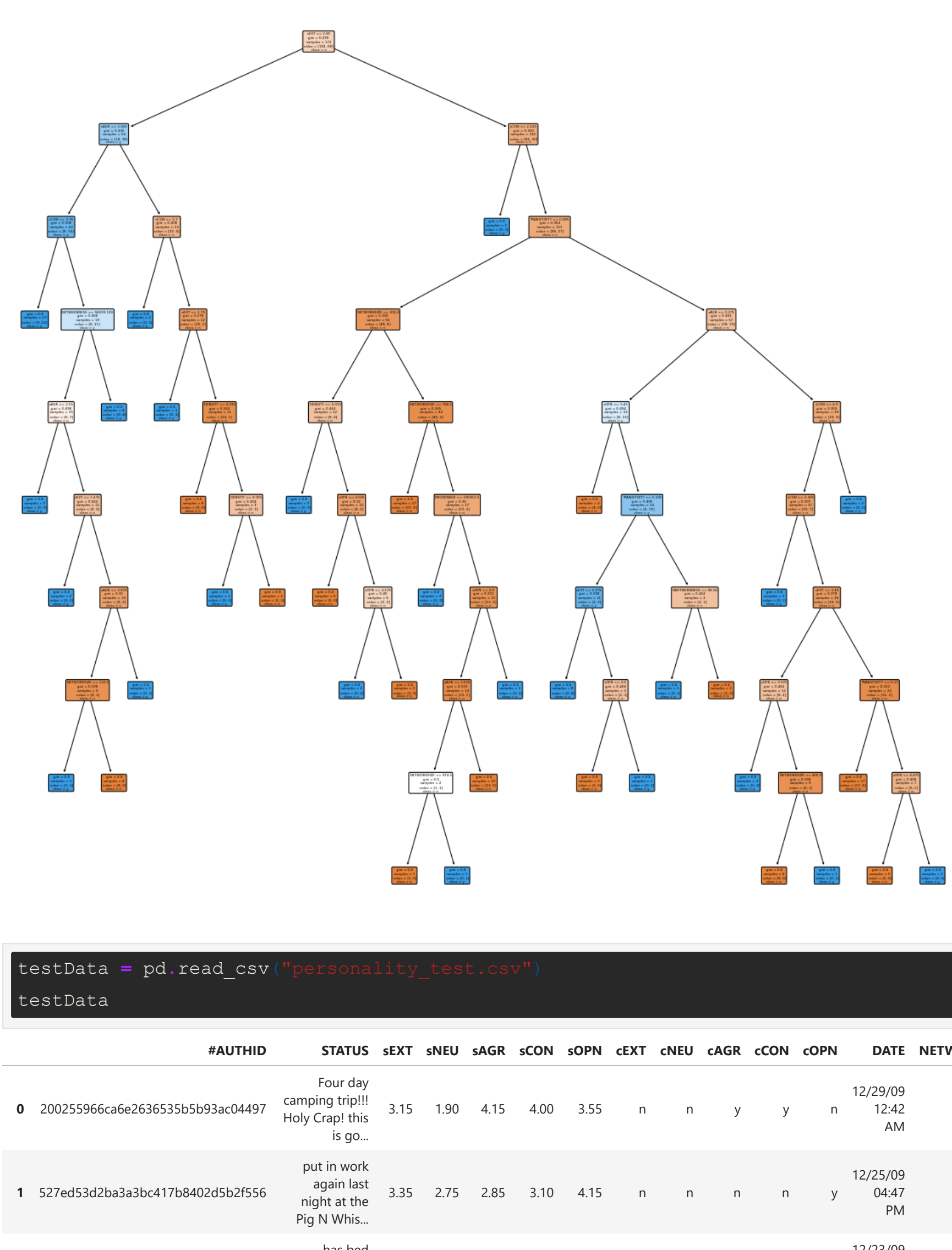
In [10]:
```python
sorted = labels.unique()
sorted = np.sort(sorted)
sorted = list(map(str, sorted))
sorted
```

Out[10]:
```
['n', 'y']
```

In [11]:
```python
from pandas.plotting import scatter_matrix
#x = tree.plot_tree(clf,feature_names=features,class_names=labels.astype(str),rounded=Tr

x = tree.plot_tree(clf,rounded=True,filled=True,class_names=sorted,feature_names=featu

plt.savefig('out.pdf')
```



In [12]:
```python
testData = pd.read_csv("personality_test.csv")
testData
```

Out[12]:

	#AUTHID	STATUS	sEXT	sNEU	sAGR	sCON	sOPN	cEXT	cNEU	cAGR	cCON	cOPN	DATE	NETWO
0	200255966ca6e2636535b5b93ac04497	Four day camping trip!!! Holy Crap! this is go...	3.15	1.90	4.15	4.00	3.55	n	n	y	y	n	12/29/09 12:42 AM	
1	527ed53d2ba3a3bc417b8402d5b2f556	put in work again last night at the Pig N Whis...	3.35	2.75	2.85	3.10	4.15	n	n	n	n	y	12/25/09 04:47 PM	
2	318bf822d4f2bd3920367560218619c0	has bed bugs..... ewwwww!	4.50	4.00	3.00	4.50	3.75	y	y	n	y	n	12/23/09 10:06 PM	
3	2badb47503a98766c89e266d1130969a	NYC on 8//18!!!!!!!!	3.55	2.30	3.65	4.65	4.60	n	n	y	y	y	12/08/09 01:27 AM	
4	1c10cc0852579d2fa000e3fc3327bb98	for the united fans reading, dont worry be hap...	2.60	2.65	2.10	2.20	3.50	n	n	n	n	n	12/06/09 08:40 PM	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
69	06b055f8e2bca96496514891057913c3	is enjoying the cricket...comfy boxers and rai...	2.85	2.35	3.35	4.70	3.35	n	n	n	y	n	06/16/09 06:22 AM	
70	138ac63ec2b55b8f48fd19c300720cae	Can anyone out there tell me if Jesus was EVER...	1.95	3.45	3.05	2.50	3.95	n	y	n	n	y	06/15/09 11:54 PM	
71	3fe44fab3eb561ae418a22182ec75fad	Debating on whether or not to drink...alcohol...	4.00	3.75	3.25	2.00	3.75	y	y	n	n	n	02/15/10 03:36 AM	
72	3fe44fab3eb561ae418a22182ec75fad	is really into the Cocteau Twins and Depeche M...	4.00	3.75	3.25	2.00	3.75	y	y	n	n	n	02/12/10 10:47 PM	
73	35efb99775d5ee7e83cf7912591984d5	Facebook me marea. Me hates it long time T-T	2.45	4.00	2.85	2.35	4.10	n	y	n	n	y	01/15/10 02:19 AM	

74 rows × 20 columns

In [13]:
```python
XTest = testData.loc[:,features]
XTest
```

Out[13]:

	NETWORKSIZE	BETWEENNESS	NBETWEENNESS	DENSITY	BROKERAGE	NBROKERAGE	TRANSITIVITY	sEXT	sAGR	sCON	sOPN
0	75	2650.67	98.14	0.04	2660	0.49	0.05	3.15	4.15	4.00	3.55
1	789	303058.00	97.74	0.01	307565	0.50	0.07	3.35	2.85	3.10	4.15
2	318	49024.80	97.88	0.02	49584	0.49	0.06	4.50	3.00	4.50	3.75
3	379	66420.90	93.22	0.03	69191	0.49	0.27	3.55	3.65	4.65	4.60
4	139	9100.53	96.27	0.04	9251	0.49	0.11	2.60	2.10	2.20	3.50
...	...	...	...	...	...	...	...	...	...	...	...
69	194	18123.10	97.81	0.02	18313	0.49	0.06	2.85	3.35	4.70	3.35
70	415	84621.10	98.98	0.01	84969	0.50	0.04	1.95	3.05	2.50	3.95
71	329	49454.70	92.22	0.03	52282	0.49	0.17	4.00	3.25	2.00	3.75
72	329	49454.70	92.22	0.03	52282	0.49	0.17	4.00	3.25	2.00	3.75
73	65	1696.85	84.17	0.10	1876	0.47	0.28	2.45	2.85	2.35	4.10

74 rows × 11 columns

In [14]:
```python
YTest = testData["cNEU"]
YTest
```

Out[14]:
```
0     n
1     n
2     y
3     n
4     n
     ..
69    n
70    y
71    y
72    y
73    y
Name: cNEU, Length: 74, dtype: object
```

In [15]:
```python
#make predictions on test data
YPredicted = clf.predict(XTest)
YPredicted
```

Out[15]:
```
array(['n', 'y', 'n', 'y', 'y', 'n', 'n', 'n', 'y', 'y', 'y', 'n', 'n',
       'n', 'n', 'y', 'n', 'n', 'y', 'y', 'n', 'y', 'y', 'y', 'n', 'n',
       'y', 'n', 'n', 'n', 'n', 'n', 'n', 'n', 'y', 'n', 'n', 'y', 'y',
       'n', 'n', 'n', 'n', 'y', 'y', 'y', 'n', 'n', 'y', 'n', 'y', 'n',
       'y', 'y', 'y', 'n', 'y', 'y', 'n', 'y', 'n', 'n', 'y', 'n', 'n',
       'n', 'n', 'n', 'n', 'n', 'y', 'y', 'y', 'y'], dtype=object)
```

In [16]:
```python
YTest
```

Out[16]:
```
0     n
1     n
2     y
3     n
4     n
     ..
69    n
70    y
71    y
72    y
73    y
Name: cNEU, Length: 74, dtype: object
```

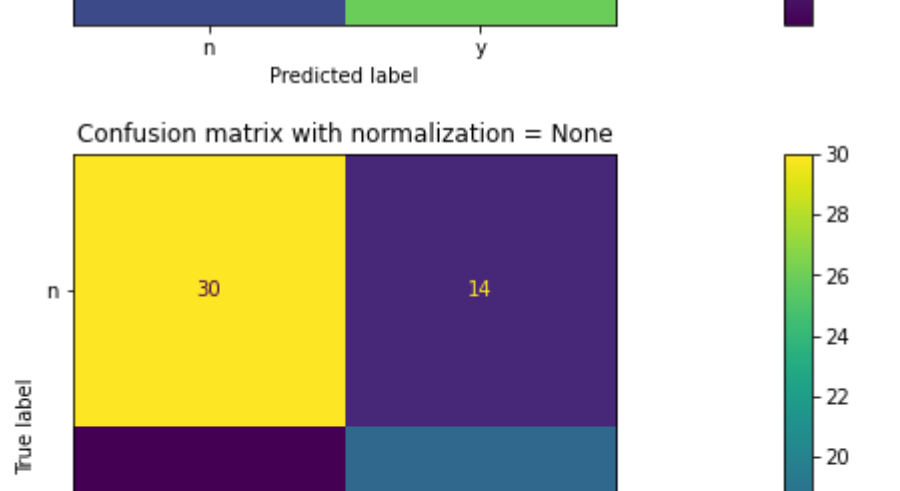
In [17]:
```python
from sklearn import metrics
accuracy = metrics.accuracy_score(YTest,YPredicted)
accuracy
```

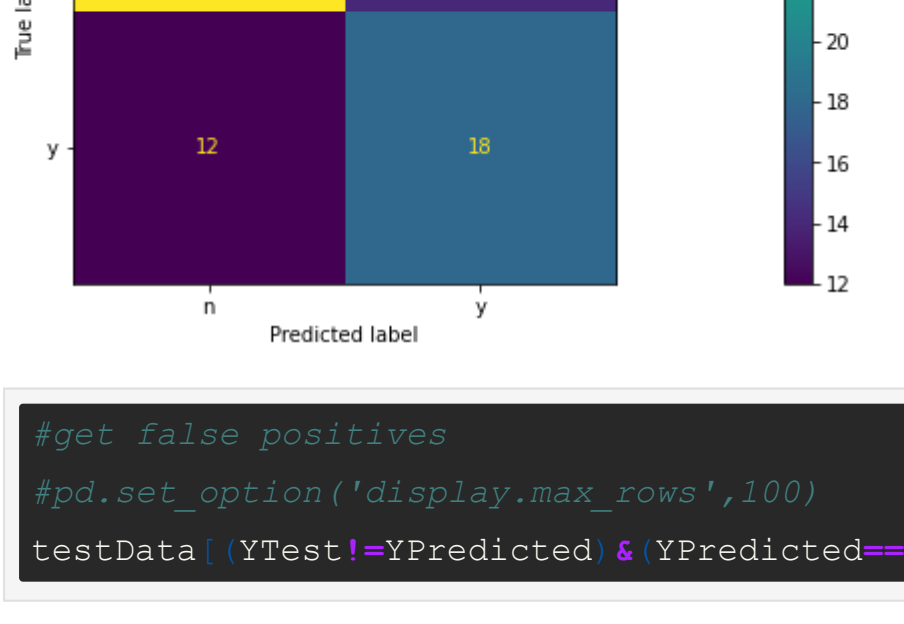
Out[17]:
```
0.6486486486486487
```

In [18]:
```python
#setup plots for confusion matrix
from sklearn.metrics import plot_confusion_matrix as matrix
figSize = plt.rcParams["figure.figsize"]
figSize[0] = 30
figSize[1] = 5
plt.rcParams["figure.figsize"]=figSize
print(plt.rcParams.get('figure.figsize'))

#plot the confusion matrices 1 for normalzied the other un-normalized
values = ['true',None]
#cmap='cividis'
for x in values:
    disp = matrix(clf,XTest,YTest,display_labels=sorted,normalize=x)
    disp.ax_.set_title("Confusion matrix with normalization = "+str(x))
print(disp.confusion_matrix)
```

```
[30.0, 5.0]
[[30 14]
 [12 18]]
```





In [19]:
```python
#get false positives
#pd.set_option('display.max_rows',100)
testData[(YTest!=YPredicted)&(YPredicted=="y")]
```

Out[19]:

	#AUTHID	STATUS	sEXT	sNEU	sAGR	sCON	sOPN	cEXT	cNEU	cAGR	cCON	cOPN	DATE	NETWOR
1	527ed53d2ba3a3bc417b8402d5b2f556	put in work again last night at the Pig N Whis...	3.35	2.75	2.85	3.10	4.15	n	n	n	n	y	12/25/09 04:47 PM	
3	2badb47503a98766c89e266d1130969a	NYC on 8//18!!!!!!!!	3.55	2.30	3.65	4.65	4.60	n	n	y	y	y	12/08/09 01:27 AM	
4	1c10cc0852579d2fa000e3fc3327bb98	for the united fans reading, dont worry be hap...	2.60	2.65	2.10	2.20	3.50	n	n	n	n	n	12/06/09 08:40 PM	
8	526ac2635cb3f5e0ee5d7424e83e9107	A vegetarian delight	2.45	2.70	3.10	4.00	4.30	n	n	n	y	y	10/29/09 06:04 AM	
9	370a8295df2f8b9069e75422c37d2639	IS SOOOOOO EXCITED 4 THE HOLS	4.00	1.65	3.10	3.10	4.50	y	n	n	n	y	10/22/09 03:15 AM	
19	225c97c90103cc04cda7d10845f2733e	has been asked by several friends about our tr...	2.70	1.45	3.80	4.35	3.30	n	n	y	y	n	08/24/09 12:30 PM	
22	1bd281623fa6ad208caa394dcad75c7d	Nothing to do in lab because the TAs messed up...	2.10	2.70	3.40	2.05	3.65	n	n	n	n	n	08/15/09 04:35 PM	
23	0bfa3d952ffed50f25011b128e73a820	is glad *PROPNAME* has taken responsibility fo...	2.80	1.60	3.65	3.25	4.15	n	n	y	n	y	08/09/09 10:59 PM	
37	3b474abc02985674f2b64e46a939bb3d	Me + Exams = Epic Phail ~.~	3.60	1.95	4.20	3.60	4.80	y	n	y	y	y	07/10/09 09:43 PM	
38	301e1788a595203d0daf3fed10afe1c9	Its way to early on a Saturday to be heading t...	3.00	2.50	4.00	3.50	3.75	n	n	y	y	n	07/10/09 02:33 PM	
44	0ea88660e23db79e2a3c897a5490d0df	is wondering how many people know that the Uni...	4.25	2.00	3.25	4.75	3.50	y	n	n	y	n	07/05/09 10:28 PM	
45	1d6d222bd3fb4c0af35466042cb82d78	Michael Jackson is dead! What is the world com...	1.95	2.40	3.80	2.80	2.70	n	n	y	n	n	07/04/09 02:28 PM	
48	5880081cd3de1619cd431a75d9052dfc	ran 19 miles today. Shower, a big glass of wat...	2.90	2.20	3.05	3.90	4.10	n	n	n	y	y	06/28/09 11:20 PM	
52	4e5bc97d95f3aca05d420bfd4e3a2639	can't wait to have all the stuff moved into th...	4.65	2.20	3.70	2.10	3.85	y	n	y	n	y	06/25/09 02:42 AM	

In [20]:
```python
#get false negative
#pd.set_option('display.max_rows',100)
testData[(YTest!=YPredicted)&(YPredicted=="n")]
```

Out[20]:

	#AUTHID	STATUS	sEXT	sNEU	sAGR	sCON	sOPN	cEXT	cNEU	cAGR	cCON	cOPN	DATE	NETWORKS
2	318bf822d4f2bd3920367560218619c0	has bed bugs..... ewwwww!	4.50	4.00	3.00	4.50	3.75	y	y	n	y	n	12/23/09 10:06 PM	
7	172400f46880b309ca5e97d322bb8f01	I have no excuses, least of all for God. Like...	3.45	2.85	2.80	2.70	4.15	n	y	n	n	y	11/18/09 04:56 AM	
12	450c787001b004af69428e267c7a4ca1	Writing, then 2 chapters homework, then bed. O...	2.30	3.50	4.50	2.85	4.50	n	y	y	n	y	09/25/09 09:53 AM	
14	4cac659f923d6f3b4605f38477a04458	I have no water right now. WHY	2.80	3.15	3.65	3.45	4.35	n	y	y	n	y	09/20/09 12:06 AM	
17	448084546d4ae45e47c3a83f338ade56	ive come to the conclusion that some people ar...	3.70	3.15	4.30	3.75	3.85	y	y	y	y	y	08/31/09 05:03 AM	
25	259f8f9cce95b214dc9924af48bcd6f0	is back from D.C. and is very tired...	3.30	2.85	4.20	3.40	4.75	n	y	y	n	y	08/06/09 07:35 PM	1
30	03e6c4eca4269c183fa0e1780f73faba	"Those who criticize our generation forget who...	3.20	3.60	3.85	4.35	4.80	n	y	y	y	y	07/23/09 05:55 PM	
31	3cc2cbf4c8c9c9f05590a092a9e9cacb	Damn, U.S. beat Spain? We should be proud	2.75	3.75	3.75	4.75	4.25	n	y	y	y	y	07/19/09 05:40 PM	
39	1187ed8a8b100eb49b8684ac30d6da29	why does it seem like im always online these d...	4.00	4.00	2.25	4.50	3.25	y	y	n	y	n	07/09/09 07:16 PM	
41	4a6ef0fc11285732bde96e8863dcb7f4	just made amazing pineapple curry jasime rice!...	3.80	3.00	3.94	3.10	4.75	y	y	y	n	y	07/08/09 05:01 PM	
58	0e09a1e89675e72bc2c3f2fac504fced	Just bought a cute pair of purple pumps :)	2.85	3.20	2.85	4.10	4.70	n	y	n	y	y	06/18/09 10:43 PM	
66	00419a4c96b32cd63b2c7196da761274	back in cali!!!	1.90	4.15	3.15	4.65	3.45	n	y	n	y	n	06/16/09 10:31 PM	