Untitled1

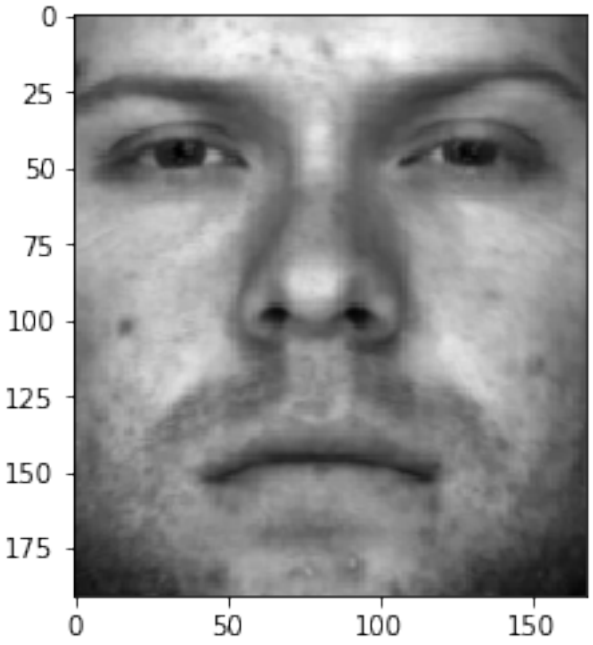
October 6, 2019

In [39]:
```
import csv
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

X1 = pd.read_csv("M1.csv").as_matrix().reshape(-1).T
X2 = pd.read_csv("M2.csv").as_matrix().reshape(-1).T
X3 = pd.read_csv("M3.csv").as_matrix().reshape(-1).T
X4 = pd.read_csv("M4.csv").as_matrix().reshape(-1).T
X5 = pd.read_csv("M5.csv").as_matrix().reshape(-1).T
X6 = pd.read_csv("M6.csv").as_matrix().reshape(-1).T
X7 = pd.read_csv("M7.csv").as_matrix().reshape(-1).T
X8 = pd.read_csv("M8.csv").as_matrix().reshape(-1).T
X9 = pd.read_csv("M9.csv").as_matrix().reshape(-1).T
X10= pd.read_csv("M10.csv").as_matrix().reshape(-1).T

X = np.array([X1,X2,X3,X4,X5,X6,X7,X8,X9,X10]).T

X_mean = np.mean(X,axis=1)
plt.imshow(X_mean.reshape(191,168),cmap="gray")
```

```
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:6: FutureWarning: Method .as_matri

/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:7: FutureWarning: Method .as_matri
  import sys
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:8: FutureWarning: Method .as_matri

/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:9: FutureWarning: Method .as_matri
  if __name__ == '__main__':
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:10: FutureWarning: Method .as_mati
  # Remove the CWD from sys.path while we load stuff.
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:11: FutureWarning: Method .as_mati
  # This is added back by InteractiveShellApp.init_path()
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:12: FutureWarning: Method .as_mati
  if sys.path[0] == '':
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:13: FutureWarning: Method .as_mati
  del sys.path[0]
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:14: FutureWarning: Method .as_mati
```

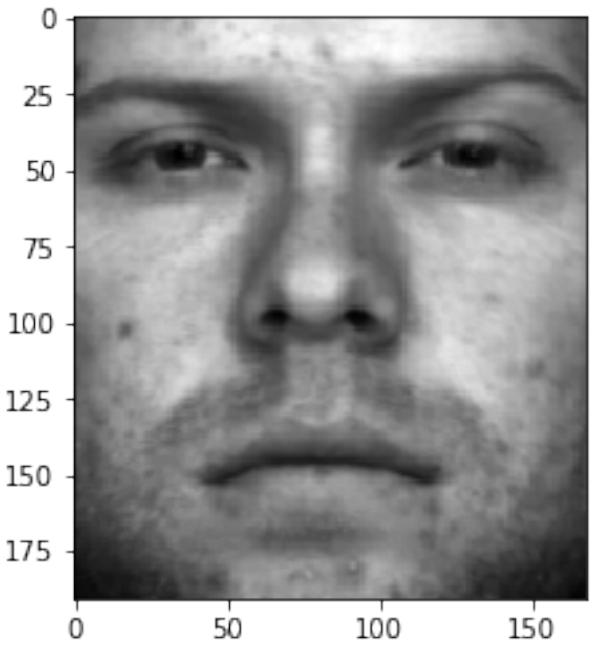
```
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:15: FutureWarning: Method .as_mati
  from ipykernel import kernelapp as app
```

Out[39]: <matplotlib.image.AxesImage at 0x118db9390>



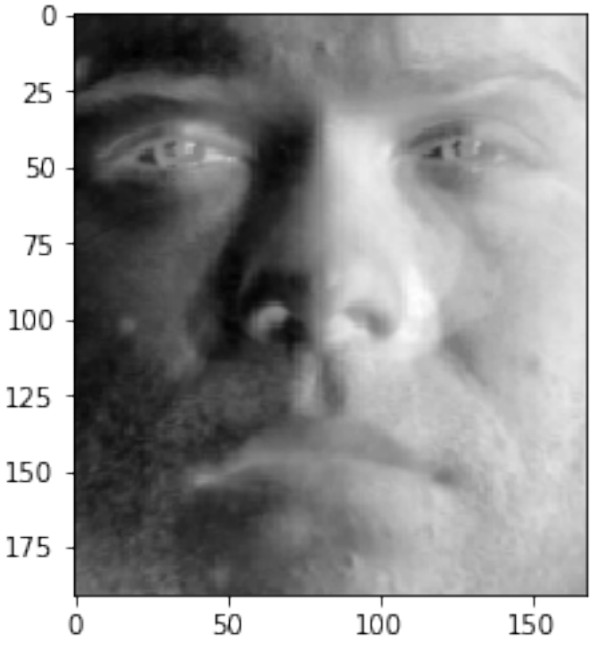
In [40]:
```
import numpy as np

mean_vec = np.mean(X, axis=0)
X = X-mean_vec
U,s,Vt = np.linalg.svd(X)

#first principal component
plt.imshow(U[:,0].reshape(191,168),cmap="gray")
```

Out[40]: <matplotlib.image.AxesImage at 0x4f1f57278>



In [41]:
```
#second principal component
plt.imshow(U[:,1].reshape(191,168),cmap="gray")
```

Out[41]: <matplotlib.image.AxesImage at 0x306a96940>



In [70]:
```
sigma = s[0:10] # standard deviation
a1 = np.array([-1,-0.8,-0.6,-0.4,-0.2,0,0.2,0.4,0.6,0.8,1])*sigma[0]
a2 = np.array([-1,-0.8,-0.6,-0.4,-0.2,0,0.2,0.4,0.6,0.8,1])*sigma[1]

fig = plt.figure(figsize=(13,13))

column = 11
row =1
for i in range(1,column*row+1):
    fig.add_subplot(row, column, i)
    plt.imshow(X_mean.reshape(191,168)+a1[i-1]*U[:,0].reshape(191,168),cmap="gray")
    plt.axis("off")
plt.show()
fig = plt.figure(figsize=(13,13))
for i in range(1,column*row+1):
    fig.add_subplot(row, column, i)
    plt.imshow(X_mean.reshape(191,168)+a2[i-1]*U[:,1].reshape(191,168),cmap="gray")
    plt.axis("off")
plt.show()
```

In [71]:
```
X1 = pd.read_csv("H1.csv").as_matrix().reshape(-1).T
X2 = pd.read_csv("H2.csv").as_matrix().reshape(-1).T
X3 = pd.read_csv("H3.csv").as_matrix().reshape(-1).T
X4 = pd.read_csv("H4.csv").as_matrix().reshape(-1).T
X5 = pd.read_csv("H5.csv").as_matrix().reshape(-1).T
X6 = pd.read_csv("H6.csv").as_matrix().reshape(-1).T
X7 = pd.read_csv("H7.csv").as_matrix().reshape(-1).T
X8 = pd.read_csv("H8.csv").as_matrix().reshape(-1).T
X9 = pd.read_csv("H9.csv").as_matrix().reshape(-1).T
X10= pd.read_csv("H10.csv").as_matrix().reshape(-1).T

X = np.array([X1,X2,X3,X4,X5,X6,X7,X8,X9,X10]).T
```

```
X_mean = np.mean(X,axis=1)
plt.imshow(X_mean.reshape(191,168),cmap="gray")
```

```
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:1: FutureWarning: Method .as_matri
  """Entry point for launching an IPython kernel.
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:2: FutureWarning: Method .as_matri

/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:3: FutureWarning: Method .as_matri
  This is separate from the ipykernel package so we can avoid doing imports until
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:4: FutureWarning: Method .as_matri
  after removing the cwd from sys.path.
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:5: FutureWarning: Method .as_matri
  """
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:6: FutureWarning: Method .as_matri

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  if __name__ == '__main__':
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:10: FutureWarning: Method .as_mati
  # Remove the CWD from sys.path while we load stuff.
```
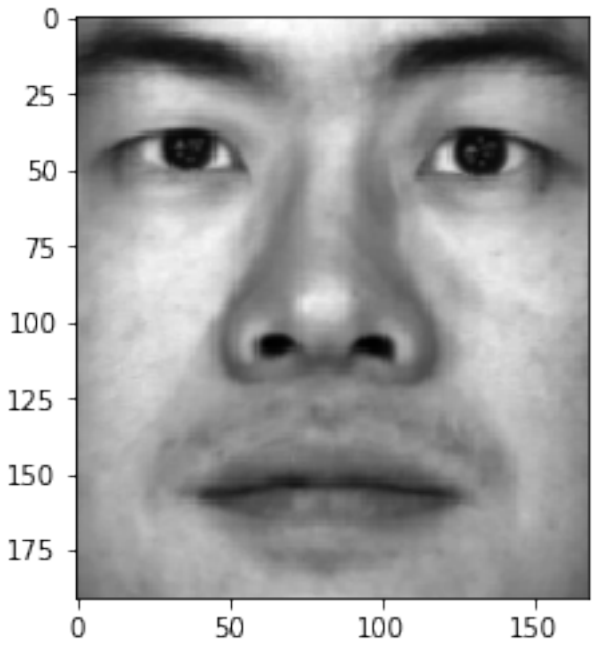
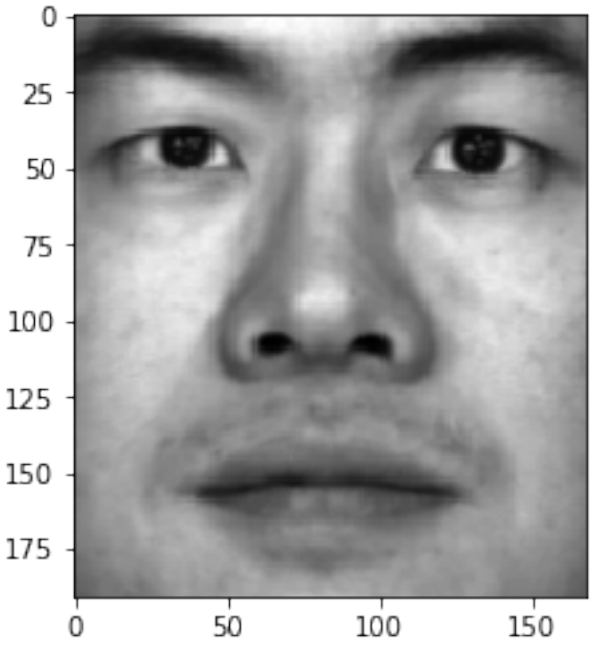

```
Out[71]: <matplotlib.image.AxesImage at 0x4f36c77b8>
```



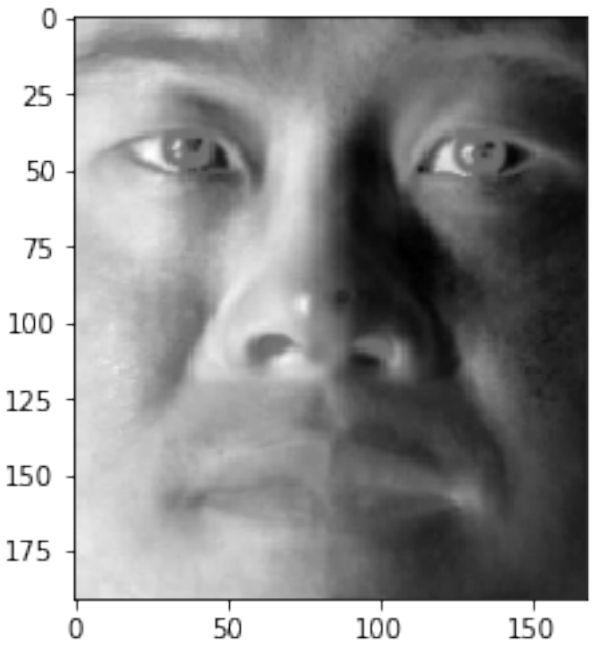
In [72]:
```
mean_vec = np.mean(X, axis=0)
X = X-mean_vec
U,s,Vt = np.linalg.svd(X)

#first principal component
plt.imshow(U[:,0].reshape(191,168),cmap="gray")
```

Out[72]: <matplotlib.image.AxesImage at 0x4f3fc6550>



In [73]:
```
#second principal component
plt.imshow(U[:,1].reshape(191,168),cmap="gray")
```

Out[73]: <matplotlib.image.AxesImage at 0x4f38b2940>



In [74]:
```
sigma = s[0:10] # standard deviation
a1 = np.array([-1,-0.8,-0.6,-0.4,-0.2,0,0.2,0.4,0.6,0.8,1])*sigma[0]
a2 = np.array([-1,-0.8,-0.6,-0.4,-0.2,0,0.2,0.4,0.6,0.8,1])*sigma[1]

fig = plt.figure(figsize=(13,13))

column = 11
row =1
for i in range(1,column*row+1):
    fig.add_subplot(row, column, i)
    plt.imshow(X_mean.reshape(191,168)+a1[i-1]*U[:,0].reshape(191,168),cmap="gray")
    plt.axis("off")
plt.show()
fig = plt.figure(figsize=(13,13))
for i in range(1,column*row+1):
    fig.add_subplot(row, column, i)
    plt.imshow(X_mean.reshape(191,168)+a2[i-1]*U[:,1].reshape(191,168),cmap="gray")
    plt.axis("off")
plt.show()
```

```
In [75]: X1 = pd.read_csv("F1.csv").as_matrix().reshape(-1).T
         X2 = pd.read_csv("F2.csv").as_matrix().reshape(-1).T
         X3 = pd.read_csv("F3.csv").as_matrix().reshape(-1).T
         X4 = pd.read_csv("F4.csv").as_matrix().reshape(-1).T
         X5 = pd.read_csv("F5.csv").as_matrix().reshape(-1).T
         X6 = pd.read_csv("F6.csv").as_matrix().reshape(-1).T
         X7 = pd.read_csv("F7.csv").as_matrix().reshape(-1).T
         X8 = pd.read_csv("F8.csv").as_matrix().reshape(-1).T
         X9 = pd.read_csv("F9.csv").as_matrix().reshape(-1).T
         X10= pd.read_csv("F10.csv").as_matrix().reshape(-1).T

         X = np.array([X1,X2,X3,X4,X5,X6,X7,X8,X9,X10]).T

         X_mean = np.mean(X,axis=1)
         plt.imshow(X_mean.reshape(191,168),cmap="gray")

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  """Entry point for launching an IPython kernel.
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  if __name__ == '__main__':
/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:10: FutureWarning: Method .as_mati
  # Remove the CWD from sys.path while we load stuff.


Out[75]: <matplotlib.image.AxesImage at 0x4f2c69358>
```
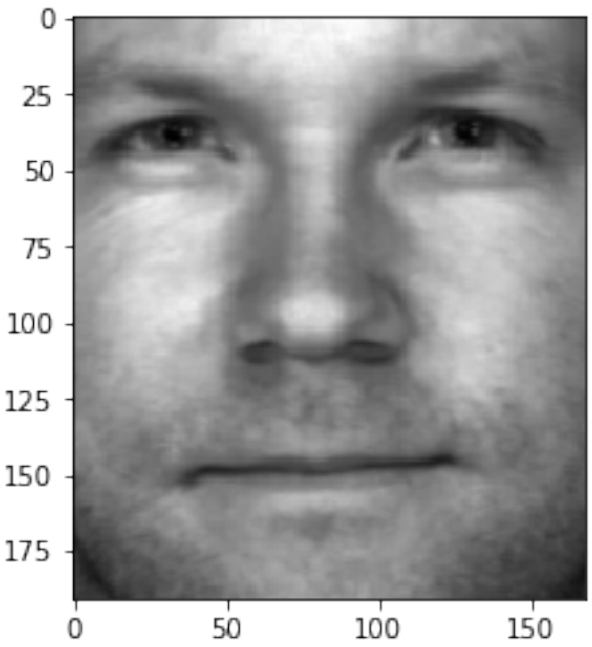
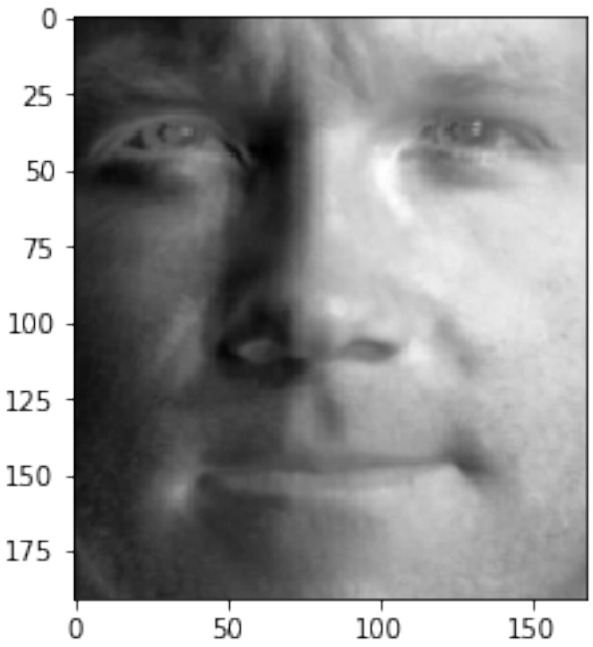



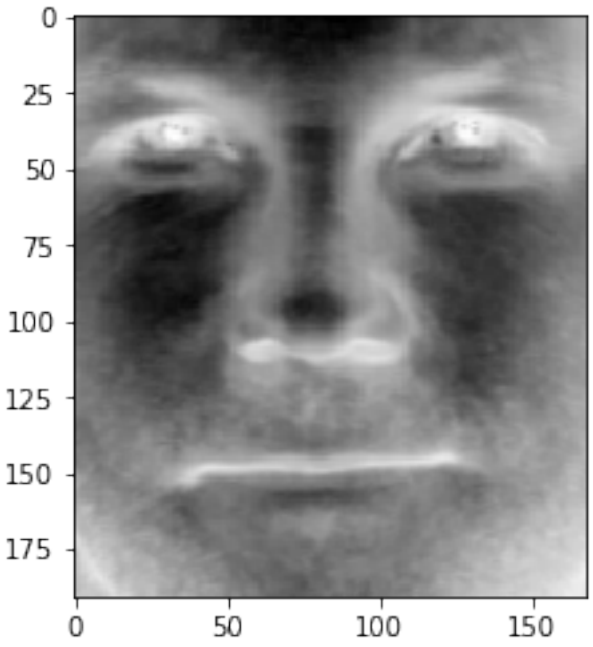

```
In [76]: mean_vec = np.mean(X, axis=0)
         X = X-mean_vec
         U,s,Vt = np.linalg.svd(X)

         #first principal component
         plt.imshow(U[:,0].reshape(191,168),cmap="gray")
```

```
Out[76]: <matplotlib.image.AxesImage at 0x4f36eb630>
```



In [77]:
```
#second principal component
plt.imshow(U[:,1].reshape(191,168),cmap="gray")
```

Out[77]: <matplotlib.image.AxesImage at 0x4f36a99e8>



In [78]:
```
sigma = s[0:10] # standard deviation
a1 = np.array([-1,-0.8,-0.6,-0.4,-0.2,0,0.2,0.4,0.6,0.8,1])*sigma[0]
a2 = np.array([-1,-0.8,-0.6,-0.4,-0.2,0,0.2,0.4,0.6,0.8,1])*sigma[1]

fig = plt.figure(figsize=(13,13))

column = 11
row =1
for i in range(1,column*row+1):
    fig.add_subplot(row, column, i)
    plt.imshow(X_mean.reshape(191,168)+a1[i-1]*U[:,0].reshape(191,168),cmap="gray")
    plt.axis("off")
plt.show()
fig = plt.figure(figsize=(13,13))
for i in range(1,column*row+1):
    fig.add_subplot(row, column, i)
    plt.imshow(X_mean.reshape(191,168)+a2[i-1]*U[:,1].reshape(191,168),cmap="gray")
    plt.axis("off")
plt.show()
```

In [ ]: