187

Mary Chris Go / 2014 11122
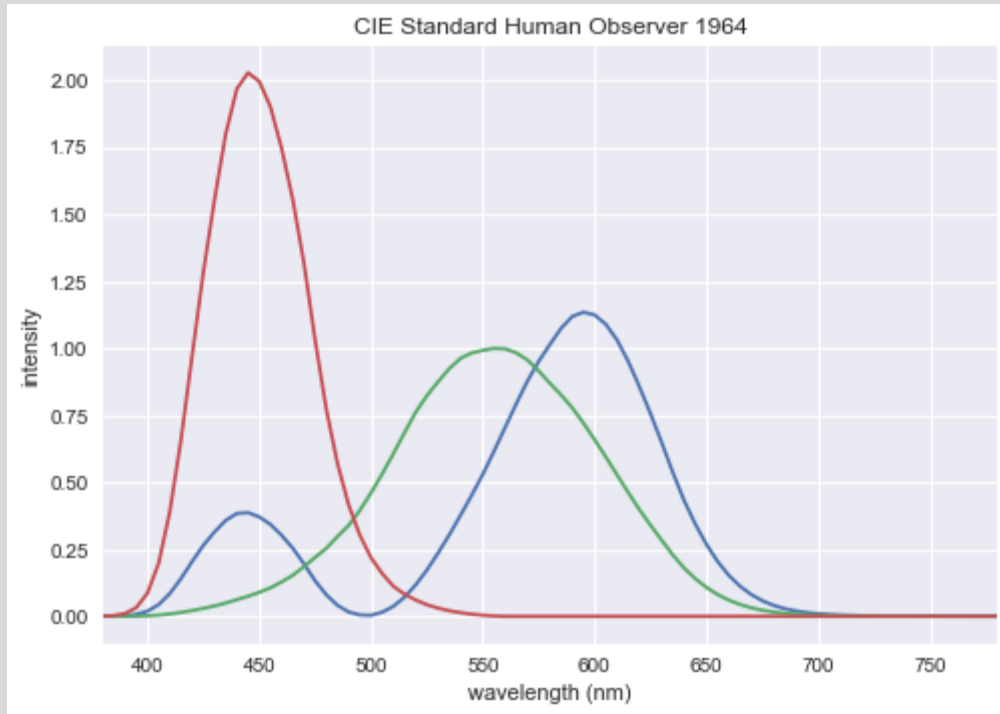
Activity 8: Color Differences

Goal

To tabulate color difference between patches under two light sources using CIE 76DE and the DE in Chroma and Hue

CIE Standard Human Observer 1964

Mary Chris Go / 2014 11122

CIE Standard Human Observer 1964

A graph of CIE Standard Human Observer 1964.

```python
w,x,y,z = np.genfromtxt('cie1964.csv', delimiter=',', unpack=True)
plt.plot(w, x,
         w, y,
         w, z)
```

```python
def p(lx,ly,m):
    y = np.interp(mac_wave,lx,ly)
    p = np.multiply(m,y)
    return p
#x = mac_wave
def cxy(x,p):
    y = np.interp(wave,x,p)
    X = np.trapz(np.multiply(y,xbar),wave)
    Y = np.trapz(np.multiply(y,ybar),wave)
    Z = np.trapz(np.multiply(y,zbar),wave)
    return [X,Y,Z]
```

```python
def f(t):
    if t >(6/29)**3 :
        f = t**(1/3)
    else:
        f = ((1/3)*((29/6)**2)*t) + (4/29)
    return f

def lab_trans(x,y,z,xn,yn,zn):
    L = 116*f(y/yn)-16
    a = 500*(f(x/xn)-f(y/yn))
    b = 200*(f(y/yn)-f(z/zn))
    return [L,a,b]
```

```python
def ch(a,b):
    c = np.sqrt(a**2 + b**2)
    h = np.arctan(b/a)
    return [c,h]

def color_diff76(l1,a1,b1,l2,a2,b2):
    E76 = np.sqrt((l2-l1)**2+(a2-a1)**2+(b2-b1)**2)
    return E76

def color_diff(l1,c1,h1,l2,c2,h2):
    E = np.sqrt((l2-l1)**2 + (c2-c1)**2 + (h2-h1)**2)
    return E
```
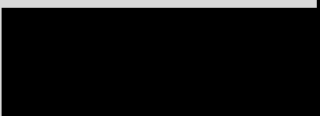
These definitions were the given equations to be able to compute the needed values. By making these lines, future computations will be more convenient.

D65, D55

> 2.3

1.16

1.37

0.91

0.46

0.25

0.37

2.28

0.69

1.91

1.26

0.97

1.77

0.82

1.06

2.6

0.77

0.51

2.59

0.17

0.12

0.19

0.15

0.11

0.08

Mary Chris Go / 2014 11122
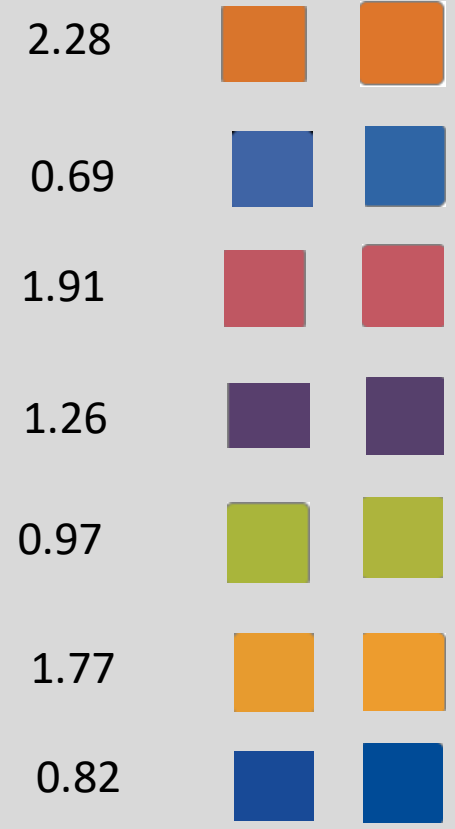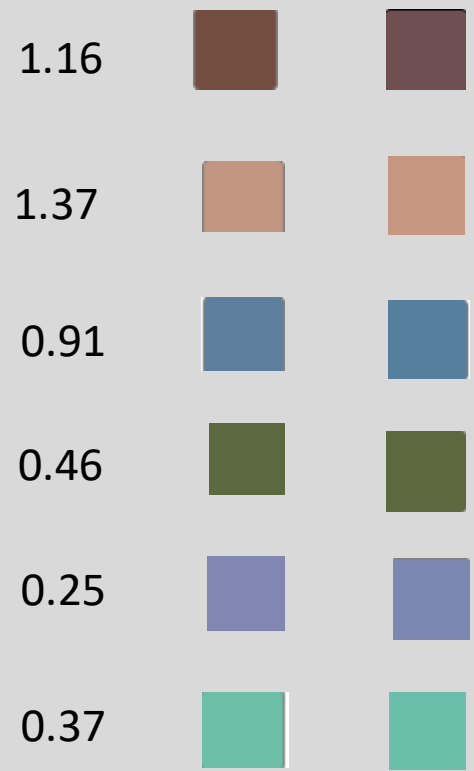
2.28

2.6

2.59

Differences

These are the values greater than 2.3. A lighter shade can be observed when you focus on it. To be honest, it's really hard to differentiate it.

```
Patch no. 1  CIE 76DE:  1.174491978783263  DE:  1.157978666105312
Patch no. 2  CIE 76DE:  1.7478901028466483  DE:  1.3673745228187093
Patch no. 3  CIE 76DE:  1.8684305925497973  DE:  0.917416112282059
Patch no. 4  CIE 76DE:  0.7805584140577541  DE:  0.46210324322221913
Patch no. 5  CIE 76DE:  1.2222511470506026  DE:  0.25031300369351556
Patch no. 6  CIE 76DE:  1.1315996906966688  DE:  0.3714747737709967
Patch no. 7  CIE 76DE:  2.325089875252884   DE:  2.28229312204632
Patch no. 8  CIE 76DE:  3.164671846069369   DE:  0.6888119780227969
Patch no. 9  CIE 76DE:  2.1452899632448785  DE:  1.9166233934776415
Patch no. 10  CIE 76DE:  1.4230843239679707  DE:  1.2606240338381478
Patch no. 11  CIE 76DE:  2.0198004125937588  DE:  0.972622620163216
Patch no. 12  CIE 76DE:  2.265455957296088   DE:  1.7744043591073542
Patch no. 13  CIE 76DE:  3.9169385543099664  DE:  0.8210368043875365
Patch no. 14  CIE 76DE:  1.0692063692374922  DE:  1.0628011391988548
Patch no. 15  CIE 76DE:  2.7275548342616394  DE:  2.6124300474174422
Patch no. 16  CIE 76DE:  2.7896494810017245  DE:  0.7716016667503607
Patch no. 17  CIE 76DE:  1.3564793265724873  DE:  0.5134916011417654
Patch no. 18  CIE 76DE:  2.608247239803205   DE:  2.590594281806554
Patch no. 19  CIE 76DE:  0.1729634790403999  DE:  0.16955169601138928
Patch no. 20  CIE 76DE:  0.027080700806471857  DE:  0.11898888175160861
Patch no. 21  CIE 76DE:  0.022882193588765413  DE:  0.18870631394548165
Patch no. 22  CIE 76DE:  0.02202075270513279  DE:  0.151829221389014
Patch no. 23  CIE 76DE:  0.05976448879412197  DE:  0.10522069141465228
Patch no. 24  CIE 76DE:  0.07727406510709015  DE:  0.08060466653453398
```

D65, D55

The chosen pair of light source is D65 and D55. I tried to get all possible combination but will focus on this pair. The next slide will show you the importance of delta E to see the differences in color. As explained, for something greater than 2.3 we expect a larger difference.

```
Patch no. 1   CIE 76DE:  1.174491978783263   DE:  1.157978666105312
Patch no. 2   CIE 76DE:  1.7478901028466483  DE:  1.3673745228187093
Patch no. 3   CIE 76DE:  1.8684305925497973  DE:  0.917416112282059
Patch no. 4   CIE 76DE:  0.7805584140577541  DE:  0.46210324322221913
Patch no. 5   CIE 76DE:  1.2222511470506026  DE:  0.25031300369351556
Patch no. 6   CIE 76DE:  1.1315996906966688  DE:  0.3714747737709967
Patch no. 7   CIE 76DE:  2.325089875252884   DE:  2.28229312204632
Patch no. 8   CIE 76DE:  3.164671846069369   DE:  0.6888119780227969
Patch no. 9   CIE 76DE:  2.1452899632448785  DE:  1.9166233934776415
Patch no. 10  CIE 76DE:  1.423084323967907   DE:  1.2606240338381478
Patch no. 11  CIE 76DE:  2.0198004125937588  DE:  0.972622620163216
Patch no. 12  CIE 76DE:  2.265455957296088   DE:  1.7744043591073542
Patch no. 13  CIE 76DE:  3.9169385543099664  DE:  0.8210368043875365
Patch no. 14  CIE 76DE:  1.0692063692374922  DE:  1.0628011391988548
Patch no. 15  CIE 76DE:  2.7275548342616394  DE:  2.6124300474174422
Patch no. 16  CIE 76DE:  2.7896494810017245  DE:  0.7716016667503607
Patch no. 17  CIE 76DE:  1.3564793265724873  DE:  0.5134916011417654
Patch no. 18  CIE 76DE:  2.608247239803205   DE:  2.590594281806554
Patch no. 19  CIE 76DE:  0.1729634790403999  DE:  0.16955169601138928
Patch no. 20  CIE 76DE:  0.027080700806471857 DE:  0.11898888175160861
Patch no. 21  CIE 76DE:  0.022882193588765413 DE:  0.18870631394548165
Patch no. 22  CIE 76DE:  0.022020752705132794 DE:  0.151829221389014
Patch no. 23  CIE 76DE:  0.05976448879412197  DE:  0.10522069141465228
Patch no. 24  CIE 76DE:  0.07727406510709015  DE:  0.08060466653453398
```

D65 and D55

```
P1 = p(D_x,D65,m_1)
tris1 = cxy(mac_wave,P1)
ls_tris1 = cxy(D_x,D65)
LAB1 = lab_trans(tris1[0],tris1[1],tris1[2],ls_tris1[0
ch1 = ch(LAB1[1],LAB1[2])


P2 = p(D_x,D55,m_1)
tris2 = cxy(mac_wave,P2)
ls_tris2 = cxy(D_x,D55)
LAB2 = lab_trans(tris2[0],tris2[1],tris2[2],ls_tris2[0
ch2 = ch(LAB2[1],LAB2[2])


dE76 = color_diff76(LAB1[0],LAB1[1],LAB1[2],LAB2[0],LA
dE = color_diff(LAB1[0],ch1[0],ch1[1],LAB2[0],ch2[0],c
print('CIE 76DE: ',dE76)
print('DE: ',dE)
```

D65, D55

Most pairs are not noticeable which is expected as the value is below 2.3. For patches with higher than 2.3, we can see a slight change from the expected color. Most of them have lighter shade. Although, an error in patch #1 can be observed.

```
Patch no. 1  CIE 76DE:  1.3604026597025947  DE:  0.3872522932846384
Patch no. 2  CIE 76DE:  4.221529313182214  DE:  2.29718636747512
Patch no. 3  CIE 76DE:  1.1922644425010436  DE:  0.697255961523805
Patch no. 4  CIE 76DE:  5.309152399104929  DE:  5.205402568483535
Patch no. 5  CIE 76DE:  5.1095734104590464  DE:  3.531755502579123
Patch no. 6  CIE 76DE:  2.133249389527404  DE:  1.3479716934351542
Patch no. 7  CIE 76DE:  2.7382560385807535  DE:  2.696825514849342
Patch no. 8  CIE 76DE:  2.5669523545934996  DE:  2.167969737627726
Patch no. 9  CIE 76DE:  8.442751498222577  DE:  8.231747623794716
Patch no. 10  CIE 76DE:  2.2235829463459362  DE:  2.0304229298577945
Patch no. 11  CIE 76DE:  6.785559364065658  DE:  6.1904361213806816
Patch no. 12  CIE 76DE:  6.983833164516042  DE:  1.0998477554166493
Patch no. 13  CIE 76DE:  2.432775307370997  DE:  2.431267298090776
Patch no. 14  CIE 76DE:  7.066983670534072  DE:  7.018677407047149
Patch no. 15  CIE 76DE:  9.731865843027014  DE:  9.626784481576905
Patch no. 16  CIE 76DE:  4.995439524723085  DE:  3.544137789372466
Patch no. 17  CIE 76DE:  8.271634485566276  DE:  7.568779658747365
Patch no. 18  CIE 76DE:  8.78922608661228  DE:  5.431180412627618
Patch no. 19  CIE 76DE:  0.2913809810154118  DE:  0.30023273925299154
Patch no. 20  CIE 76DE:  0.18432893308518877  DE:  0.2540395626331346
Patch no. 21  CIE 76DE:  0.16936674581533917  DE:  0.27226213131532884
Patch no. 22  CIE 76DE:  0.123314763040522  DE:  0.1819251327012064
Patch no. 23  CIE 76DE:  0.11326778078349882  DE:  0.2358833060677411
Patch no. 24  CIE 76DE:  0.09272279580323015  DE:  0.0961912697040398
```

White led, fluorescent

The next few slides will just be the obtained values for other pairs.

```
Patch no. 1  CIE 76DE:  2.386926868849206   DE:   2.3307438456569227
Patch no. 2  CIE 76DE:  2.837451209829394   DE:   1.5078804734164724
Patch no. 3  CIE 76DE:  2.050435872056297   DE:   0.6720371196356529
Patch no. 4  CIE 76DE:  6.345737887334448   DE:   6.3418028912977995
Patch no. 5  CIE 76DE:  5.1628707528067    DE:   4.973473507866695
Patch no. 6  CIE 76DE:  5.687923610442239   DE:   4.150312143696666
Patch no. 7  CIE 76DE:  5.377119069371583   DE:   5.22911358357542
Patch no. 8  CIE 76DE:  4.805068713428388   DE:   4.624681298583482
Patch no. 9  CIE 76DE:  7.339832414982669   DE:   3.759353504983803
Patch no. 10  CIE 76DE:  4.929821215658956   DE:   2.0248424155971647
Patch no. 11  CIE 76DE:  7.655639813129256   DE:   7.654764491560541
Patch no. 12  CIE 76DE:  7.14695939077096    DE:   1.0821300025269576
Patch no. 13  CIE 76DE:  6.669909593348964   DE:   6.505546748584623
Patch no. 14  CIE 76DE:  9.590292257754005   DE:   7.356508042633245
Patch no. 15  CIE 76DE:  7.976922331657233   DE:   5.110543210581597
Patch no. 16  CIE 76DE:  5.237557443870082   DE:   3.1635765722496836
Patch no. 17  CIE 76DE:  8.626476672360265   DE:   5.281605784505529
Patch no. 18  CIE 76DE:  10.122811436814743  DE:   6.66435461177804
Patch no. 19  CIE 76DE:  0.5147768519524717  DE:   0.5232978530889706
Patch no. 20  CIE 76DE:  0.2138942096427989  DE:   0.9391008227749109
Patch no. 21  CIE 76DE:  0.08911514397446436  DE:   0.11319065684941133
Patch no. 22  CIE 76DE:  0.05694747237782914  DE:   0.12331252013139009
Patch no. 23  CIE 76DE:  0.05316747239382472  DE:   0.07337157120597149
Patch no. 24  CIE 76DE:  0.14553541636139528  DE:   0.15274970734717416
```

D65, fluorescent

```
Patch no. 1  CIE 76DE:  2.4110071500987664  DE:  2.2512300587650866
Patch no. 2  CIE 76DE:  3.3061288535741875  DE:  3.0312095370628827
Patch no. 3  CIE 76DE:  0.957932688438315   DE:  0.05550354850010081
Patch no. 4  CIE 76DE:  1.6819188468137243  DE:  1.2289408185595772
Patch no. 5  CIE 76DE:  2.5589516342858194  DE:  1.480306956008709
Patch no. 6  CIE 76DE:  3.5715934336131565  DE:  2.8048883232250184
Patch no. 7  CIE 76DE:  2.652335849290111   DE:  2.533398433812037
Patch no. 8  CIE 76DE:  2.4661598341927973  DE:  2.4659545608730604
Patch no. 9  CIE 76DE:  8.171305123086894   DE:  7.18956542116367
Patch no. 10  CIE 76DE:  5.509406234579877  DE:  1.7137797013515412
Patch no. 11  CIE 76DE:  3.274777034096343  DE:  1.7829753832250355
Patch no. 12  CIE 76DE:  0.8113808616268133  DE:  0.801193698375342
Patch no. 13  CIE 76DE:  4.365730866956706  DE:  4.1470526219618815
Patch no. 14  CIE 76DE:  5.390897564952951  DE:  2.0205987730463093
Patch no. 15  CIE 76DE:  14.353152686275378  DE:  13.768680363094026
Patch no. 16  CIE 76DE:  0.962458512989685  DE:  0.7298817481147118
Patch no. 17  CIE 76DE:  11.034584504091823  DE:  5.649019462461136
Patch no. 18  CIE 76DE:  1.4172779434153353  DE:  1.2634922045499353
Patch no. 19  CIE 76DE:  0.7801732770546639  DE:  0.7841566546964891
Patch no. 20  CIE 76DE:  0.38123976225926925  DE:  1.1403806927002986
Patch no. 21  CIE 76DE:  0.24862634458265126  DE:  0.28917260302616216
Patch no. 22  CIE 76DE:  0.17965494095487716  DE:  0.3025284218243415
Patch no. 23  CIE 76DE:  0.147896476061171  DE:  0.294923985053681
Patch no. 24  CIE 76DE:  0.06033258035166393  DE:  0.0633447533770096
```

D65, white led

```
Patch no. 1  CIE 76DE:  4.641492992288817  DE:  4.385003940463666
Patch no. 2  CIE 76DE:  5.941577298137522  DE:  5.708677553406545
Patch no. 3  CIE 76DE:  6.725830186445651  DE:  5.005383770554109
Patch no. 4  CIE 76DE:  2.9082830121907377 DE:  1.9654251594832983
Patch no. 5  CIE 76DE:  3.7719249493341764 DE:  1.6471226390574332
Patch no. 6  CIE 76DE:  7.34053513964181   DE:  3.721790253703403
Patch no. 7  CIE 76DE:  11.432376255040158 DE:  9.96225480100009
Patch no. 8  CIE 76DE:  11.941703510591338 DE:  5.890157008079498
Patch no. 9  CIE 76DE:  10.318661693456436 DE:  6.08812211909187
Patch no. 10  CIE 76DE:  5.57147380145261  DE:  4.733853682504941
Patch no. 11  CIE 76DE:  7.239970140863014 DE:  4.1674794365334416
Patch no. 12  CIE 76DE:  8.53371486980654  DE:  8.501460557933862
Patch no. 13  CIE 76DE:  16.58510806480662 DE:  6.717845362048814
Patch no. 14  CIE 76DE:  6.279554041255013 DE:  6.263735872138015
Patch no. 15  CIE 76DE:  11.529027031895309 DE:  8.256177973880595
Patch no. 16  CIE 76DE:  7.808109475229734 DE:  4.3167042090789005
Patch no. 17  CIE 76DE:  7.816847305556572 DE:  4.958521772837356
Patch no. 18  CIE 76DE:  11.913138916522065 DE:  10.435870209043838
Patch no. 19  CIE 76DE:  0.47731524814506654 DE:  0.4798096886988617
Patch no. 20  CIE 76DE:  0.06371656548074066 DE:  0.23062297248493474
Patch no. 21  CIE 76DE:  0.15033975518693737 DE:  1.290959375411073
Patch no. 22  CIE 76DE:  0.1387343307046045 DE:  1.7073338629886603
Patch no. 23  CIE 76DE:  0.22155156173502835 DE:  0.33623281235499647
Patch no. 24  CIE 76DE:  0.2545274898955149 4 DE:  0.25341569925186397
```

D65, incandescent

```
Patch no. 1  CIE 76DE:  2.386926868849206  DE:  2.3307438456569227
Patch no. 2  CIE 76DE:  2.837451209829394  DE:  1.5078804734164724
Patch no. 3  CIE 76DE:  2.0504358720567297  DE:  0.6720371196356529
Patch no. 4  CIE 76DE:  6.345737887334448  DE:  6.3418028912977995
Patch no. 5  CIE 76DE:  5.1628707528067  DE:  4.973473507866695
Patch no. 6  CIE 76DE:  5.687923610442239  DE:  4.150312143696666
Patch no. 7  CIE 76DE:  5.377119069371583  DE:  5.22911358357542
Patch no. 8  CIE 76DE:  4.805068713428388  DE:  4.624681298583482
Patch no. 9  CIE 76DE:  7.339832414982669  DE:  3.759353504983803
Patch no. 10  CIE 76DE:  4.929821215658956  DE:  2.0248424155971647
Patch no. 11  CIE 76DE:  7.655639813129256  DE:  7.654764491560541
Patch no. 12  CIE 76DE:  7.14695939077096  DE:  1.0821300025269576
Patch no. 13  CIE 76DE:  6.669909593348964  DE:  6.505546748584623
Patch no. 14  CIE 76DE:  9.590292257754005  DE:  7.356508042633245
Patch no. 15  CIE 76DE:  7.976922331657233  DE:  5.110543210581597
Patch no. 16  CIE 76DE:  5.237557443870082  DE:  3.1635765722496836
Patch no. 17  CIE 76DE:  8.626476672360265  DE:  5.281605784505529
Patch no. 18  CIE 76DE:  10.12811436814743  DE:  6.66435461177804
Patch no. 19  CIE 76DE:  0.5147768519524717  DE:  0.5232978530889706
Patch no. 20  CIE 76DE:  0.2138942096427989  DE:  0.9391008227749109
Patch no. 21  CIE 76DE:  0.08911514397446436  DE:  0.11319065684941133
Patch no. 22  CIE 76DE:  0.05694747237782914  DE:  0.12331252013139009
Patch no. 23  CIE 76DE:  0.0531674723938247  DE:  0.07337157120597149
Patch no. 24  CIE 76DE:  0.14553541636139528  DE:  0.15274970734717416
```

D65, fluorescent

```
Patch no. 1   CIE 76DE:  3.493974803661234   DE:   3.477113064503037
Patch no. 2   CIE 76DE:  2.946467755636959   DE:   2.5919853304057168
Patch no. 3   CIE 76DE:  3.6387062972354496  DE:   0.3331976118424817
Patch no. 4   CIE 76DE:  6.7411474420270565  DE:   6.724375104647636
Patch no. 5   CIE 76DE:  5.598894439205682   DE:   4.911817032011225
Patch no. 6   CIE 76DE:  6.475474712685071   DE:   4.254130406732318
Patch no. 7   CIE 76DE:  7.554614251897767   DE:   7.507194558325881
Patch no. 8   CIE 76DE:  6.092959422788604   DE:   4.046290427624128
Patch no. 9   CIE 76DE:  8.454785359770208   DE:   4.077557099481814
Patch no. 10  CIE 76DE:  4.719834752110842   DE:   2.892421527692085
Patch no. 11  CIE 76DE:  8.601205742555459   DE:   8.42105465484299
Patch no. 12  CIE 76DE:  8.83610743281985    DE:   2.2422798224452505
Patch no. 13  CIE 76DE:  8.06386130505528    DE:   5.870193491042905
Patch no. 14  CIE 76DE:  10.184957340198281  DE:   8.257375173125334
Patch no. 15  CIE 76DE:  10.282231465388687  DE:   7.5145919685628195
Patch no. 16  CIE 76DE:  7.349151899973493   DE:   2.498897264673254
Patch no. 17  CIE 76DE:  9.94840475738045    DE:   5.77033244060731
Patch no. 18  CIE 76DE:  11.8232629296217    DE:   9.06158218547591
Patch no. 19  CIE 76DE:  0.3545220825578601  DE:   0.3589664933068199
Patch no. 20  CIE 76DE:  0.1877990624227882  DE:   0.8204595171961777
Patch no. 21  CIE 76DE:  0.09862145541888619 DE:   0.1526770619067263
Patch no. 22  CIE 76DE:  0.07602639108809861 DE:   0.2701685114065017
Patch no. 23  CIE 76DE:  0.107424979754563   DE:   0.1746270726308399
Patch no. 24  CIE 76DE:  0.12749960187384826 DE:   0.12813919158668619
```

D55, fluorescent

```
Patch no. 1  CIE 76DE:  3.5736664768312214   DE:  3.4091190497028347
Patch no. 2  CIE 76DE:  4.996271294161079    DE:  4.396346006005005
Patch no. 3  CIE 76DE:  2.7701341284949654   DE:  0.9520687323472118
Patch no. 4  CIE 76DE:  1.6175910069665373   DE:  1.5389320606183547
Patch no. 5  CIE 76DE:  1.6317763565610857   DE:  1.3866667779844324
Patch no. 6  CIE 76DE:  4.345636608269641    DE:  2.907424413297902
Patch no. 7  CIE 76DE:  4.823949317898433    DE:  4.8103806502757305
Patch no. 8  CIE 76DE:  3.689699139409956    DE:  1.9310815455063293
Patch no. 9  CIE 76DE:  10.315480602819513   DE:  9.10458253204803
Patch no. 10  CIE 76DE:  4.710753538694219   DE:  1.4625064049035625
Patch no. 11  CIE 76DE:  2.478420818697218   DE:  2.292486034030105
Patch no. 12  CIE 76DE:  2.9887964126763005  DE:  2.567453644823161
Patch no. 13  CIE 76DE:  6.444796533786883   DE:  3.595100637392697
Patch no. 14  CIE 76DE:  5.223573101548757   DE:  1.9950353915156747
Patch no. 15  CIE 76DE:  17.077585553788516  DE:  16.380878262082575
Patch no. 16  CIE 76DE:  3.4648395821227913  DE:  1.056882353288691
Patch no. 17  CIE 76DE:  12.151093073344013  DE:  5.853506936563049
Patch no. 18  CIE 76DE:  3.8430111611595232  DE:  3.8256173494387054
Patch no. 19  CIE 76DE:  0.6342031185733024  DE:  0.6342837501323794
Patch no. 20  CIE 76DE:  0.35455423176541745 DE:  1.0242449314072126
Patch no. 21  CIE 76DE:  0.2638790961323328  DE:  0.4246730296042146
Patch no. 22  CIE 76DE:  0.1989739723567771  DE:  0.4401272276516283
Patch no. 23  CIE 76DE:  0.20705641751625212 DE:  0.3985219732004 2065
Patch no. 24  CIE 76DE:  0.05544896097007934 DE:  0.05610012697801811
```

D55, White led

```
Patch no. 1   CIE 76DE:   3.7208575744053043   DE:   3.269468952433725
Patch no. 2   CIE 76DE:   4.388128131548846    DE:   4.361202348751287
Patch no. 3   CIE 76DE:   4.952707615658894    DE:   4.091023373772043
Patch no. 4   CIE 76DE:   2.139577026888702    DE:   1.5052878128454323
Patch no. 5   CIE 76DE:   2.625781659488014    DE:   1.4731522139705795
Patch no. 6   CIE 76DE:   6.308348272147737    DE:   3.418102832497331
Patch no. 7   CIE 76DE:   9.904932177421097    DE:   7.7496192903898145
Patch no. 8   CIE 76DE:   8.833927826937627    DE:   5.369870562614966
Patch no. 9   CIE 76DE:   8.764276649923765    DE:   4.542486972337161
Patch no. 10  CIE 76DE:   4.1502579462964535   DE:   3.4742231250909525
Patch no. 11  CIE 76DE:   5.249594388074532    DE:   3.1949473336857843
Patch no. 12  CIE 76DE:   7.112753938027205    DE:   6.754396997013623
Patch no. 13  CIE 76DE:   12.69125370469215    DE:   6.06603984349295
Patch no. 14  CIE 76DE:   5.237386716134698    DE:   5.208445545384188
Patch no. 15  CIE 76DE:   9.454714955433875    DE:   5.885982709847322
Patch no. 16  CIE 76DE:   5.204367143116009    DE:   3.547597080194758
Patch no. 17  CIE 76DE:   6.616485083691941    DE:   4.52040420054037
Patch no. 18  CIE 76DE:   9.720340831241298    DE:   7.947470408014015
Patch no. 19  CIE 76DE:   0.31159632855293434  DE:   0.3310726701281858
Patch no. 20  CIE 76DE:   0.08558493712829841  DE:   0.3482145844150734
Patch no. 21  CIE 76DE:   0.132841129551967    DE:   1.4790548969384636
Patch no. 22  CIE 76DE:   0.11916723518446319  DE:   1.858277323915112
Patch no. 23  CIE 76DE:   0.16208957147680098  DE:   0.2327040047435248
Patch no. 24  CIE 76DE:   0.18184631969530463  DE:   0.18040936264699287
```

D55, incandescent

```
Patch no. 1  CIE 76DE:  7.005092068272525   DE:  6.712982595733828
Patch no. 2  CIE 76DE:  6.970582567102457   DE:  6.891300245216754
Patch no. 3  CIE 76DE:  7.971055568645179   DE:  4.351497787150824
Patch no. 4  CIE 76DE:  8.378012502228597   DE:  8.094912293422205
Patch no. 5  CIE 76DE:  6.289228322605129   DE:  3.6735686629084294
Patch no. 6  CIE 76DE:  10.626886468949708  DE:  4.546320214850569
Patch no. 7  CIE 76DE:  16.582862588648457  DE:  15.155277773885272
Patch no. 8  CIE 76DE:  12.75276681449105   DE:  3.1424967597438633
Patch no. 9  CIE 76DE:  17.208144295446083  DE:  8.434221703188776
Patch no. 10  CIE 76DE:  6.196544253784009  DE:  6.090638684996744
Patch no. 11  CIE 76DE:  12.7549890692556   DE:  11.185933825598031
Patch no. 12  CIE 76DE:  10.892420398197133  DE:  8.601173922460548
Patch no. 13  CIE 76DE:  17.95808739130558  DE:  3.472293433043429
Patch no. 14  CIE 76DE:  14.61048418958827  DE:  13.219293602982638
Patch no. 15  CIE 76DE:  19.50460343131229  DE:  13.3397140404025
Patch no. 16  CIE 76DE:  11.078053426990666  DE:  2.2624046394025386
Patch no. 17  CIE 76DE:  16.328191741792267  DE:  10.191461683635959
Patch no. 18  CIE 76DE:  16.440835387854342  DE:  16.11071295007151
Patch no. 19  CIE 76DE:  0.2711749620289344  DE:  0.3042271913324658
Patch no. 20  CIE 76DE:  0.2686271709652558  DE:  1.167289456739311
Patch no. 21  CIE 76DE:  0.2286550956945406  DE:  1.3676058916579938
Patch no. 22  CIE 76DE:  0.19356217119572633  DE:  1.5996030311630625
Patch no. 23  CIE 76DE:  0.26826038088971976  DE:  0.4066327724296129
Patch no. 24  CIE 76DE:  0.2644537074632267  DE:  0.265869118350983
```

Incandescent, fluorescent

So far, this has been showing larger obtained values. If I do something similar to my first pair, a large difference will be observed.

Summary

I tried to see my work in another's laptop. It's all different when you check it. The colors changes. For the many errors, we can take into account the capacity of a laptop screen. Also, the values are so close. It's hard to pinpoint the differences especially if we're talking about a minimal difference in shade. So far, a combination of a incandescent and fluorescent is not a good combo. A large difference in color will be observed.

The activity was fun, but a bit tedious to code. Also, the colors are hard to differentiate so I wouldn't enjoy making another activity like this. Although, I've learned a lot especially I'm into photography and videography. Choice of light really matters. The colors are we choose can change depending on the light.

Mary Chris Go / 2014 11122

References

- Soriano, M. Color Differences, Applied Physics 187

Mary Chris Go / 2014 11122