**We are using true MSE value in our calculation

Describe in 1-2 sentences in the PDF how the weight vectors from the different methods are different.

The weight vector in part 1 is calculated by a closed formula, or analytical solution, and has a much larger magnitude than those for parts 2 and 3. The weight vectors in part 2 and 3 are calculated by gradient descent, or numerical solution, which is slower but results in a better testing accuracy. The image produced by the weight vector in part 2 and 3 has more contour than the one in part 1, and although the difference is not clearly visible to the eyes, part 3 in theory captures a more characterized weight vector than part 2.

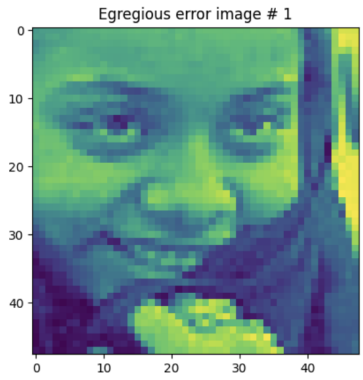
Next, using the regressor in part (c), predict the ages of all the images in the test set and report the RMSE (in years).

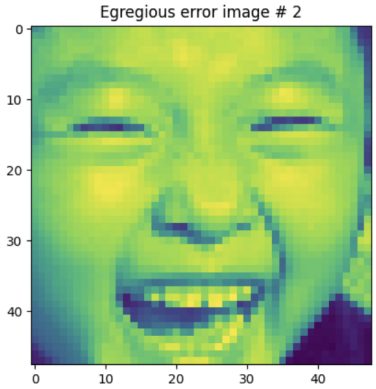
RMSE Regularization: 13.64472630390793

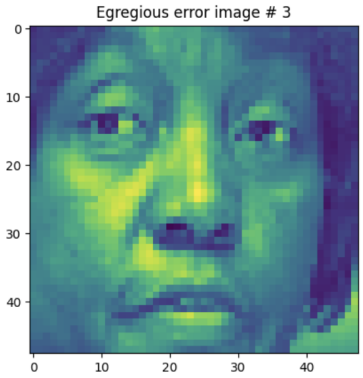
Then, show the top 5 most egregious errors, i.e., the test images whose ground-truth label y is farthest from your machine's estimate ˆy. Include the images, along with associated y and ˆy values, in a PDF

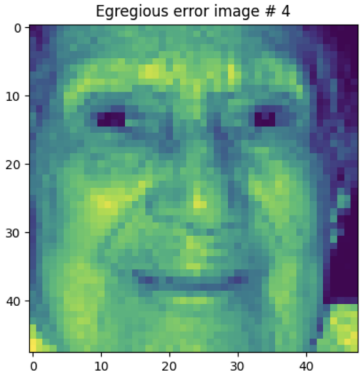
y for top 1: 10.0
yhat for top 1: 59.90434076905585
error: 49.90434076905585
y for top 2: 4.0
yhat for top 2: 52.41878351651259
error: 48.41878351651259
y for top 3: 89.0
yhat for top 3: 41.66915987145066
error: 47.33084012854934
y for top 4: 80.0
yhat for top 4: 33.253657027441434
error: 46.746342972558566
y for top 5: 8.0
yhat for top 5: 53.579741728119586
error: 45.579741728119586

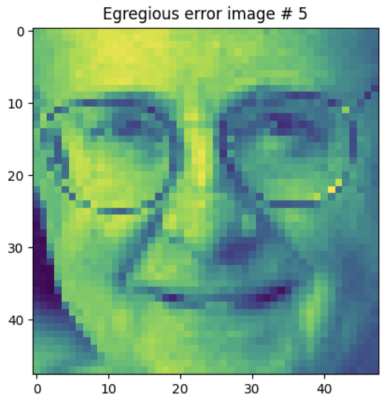
Images are below…



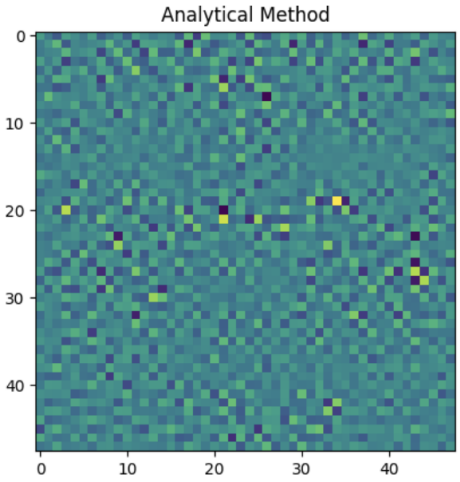


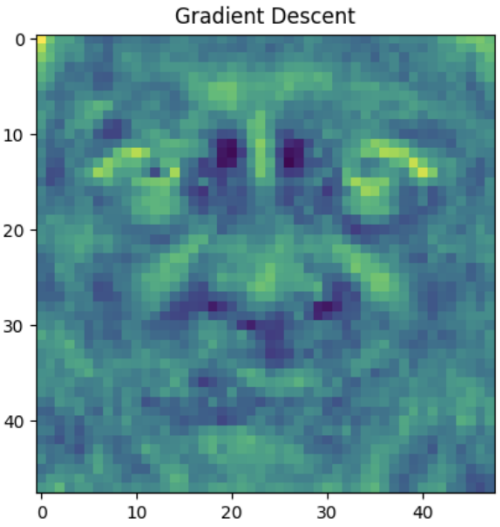


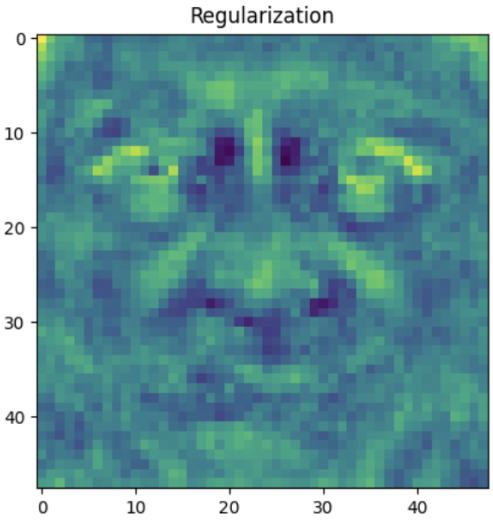




Output for all of the losses along with an outputted image for each method:
Analytical Training Loss: 78.48592597858139
Analytical Testing Loss : 413.59294970556147
Gradient Descent Training Loss: 167.10924159608183
Gradient Descent Testing Loss : 186.18771091263122
Regularization Training Loss: 167.09655862799306
Regularization Testing Loss : 186.17855590855694


Analytical Method
0
10
20
30
40
0
10
20
30
40


Gradient Descent
0
10
20
30
40
0
10
20
30
40


Regularization
0
10
20
30
40
0
10
20
30
40