ECE 460J Data Science Lab 2 Report:

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Problem 1:

Using the pandas.scatter function, we can quickly see that there is a correlation between features 0 and 2, and 1 and 3.

We run the following code with pandas

```python
df1 = pd.read_csv("DF1", index_col = 0)
for i in range(0, 4):
    for j in range(i + 1, 4):
        df1.plot.scatter(x = str(i), y = str(j),s = 1)
        plt.show()
```
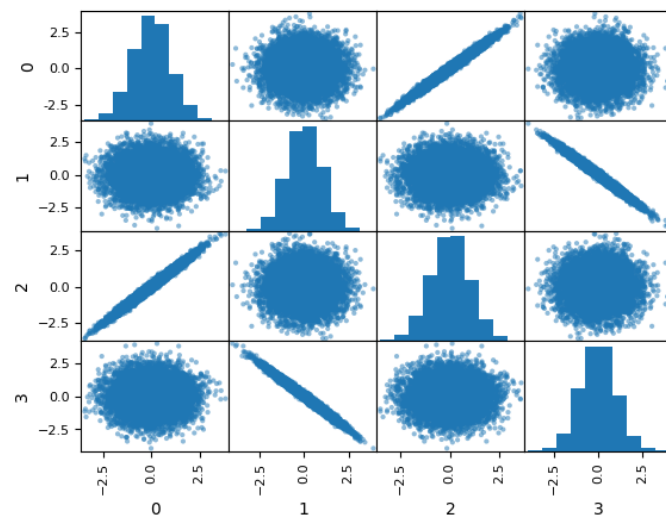
Or the following code with seaborn

```python
df1 = pd.read_csv("DF1", index_col = 0)
for i in range(0, 4):
    for j in range(i + 1, 4):
        sns.lmplot(x = str(i), y = str(j), data = df1, fit_reg = False)
        plt.show()
```

And produce graphs sequentially.

Alternatively, (and compactly), pandas provides a scatter_matrix which produces the same results but in a single image:

```python
pd.plotting.scatter_matrix(df1)
```

The scatter plots:

The covariance matrix for this matrix defines the following:

```
var(0),   cov(0,1), cov(0,2), cov(0,3)
cov(1,0), var(1),   cov(1,2), cov(1,3)
cov(2,0), cov(2,1), var(2),   cov(2,3)
cov(3,0), cov(3,1), cov(3,2), var(3)
```

Representing all the various covariances between features in the data.

Using pandas we can compute the covariance matrix using .cov()

```
df1.cov()
```

And we get the following result:

	0	1	2	3
0	1.001558	-0.004012	0.991624	0.004125
1	-0.004012	1.005378	-0.004099	-0.995457
2	0.991624	-0.004099	1.001589	0.004081
3	0.004125	-0.995457	0.004081	1.005168

This produces the result we would expect;
The visual variance, for each feature (var(i)), from the scatter matrix visually has a variance of 1.
The features that are uncorrelated have covariance close to zero, which is expected.
And finally the features that are correlated (1,3 and 0,2) have covariances with absolute value greater than zero in a significant way. Again, as expected.
The covariance matches the scatter matrix box for box, uncorrelated data showing a covariance close to zero, positively correlated data having a covariance close to 1, and negatively correlated data showing a covariance close to -1.

Per the instructions for part 3, we generate samples from a multivariate gaussian to show that estimate covariance converges to real covariance:
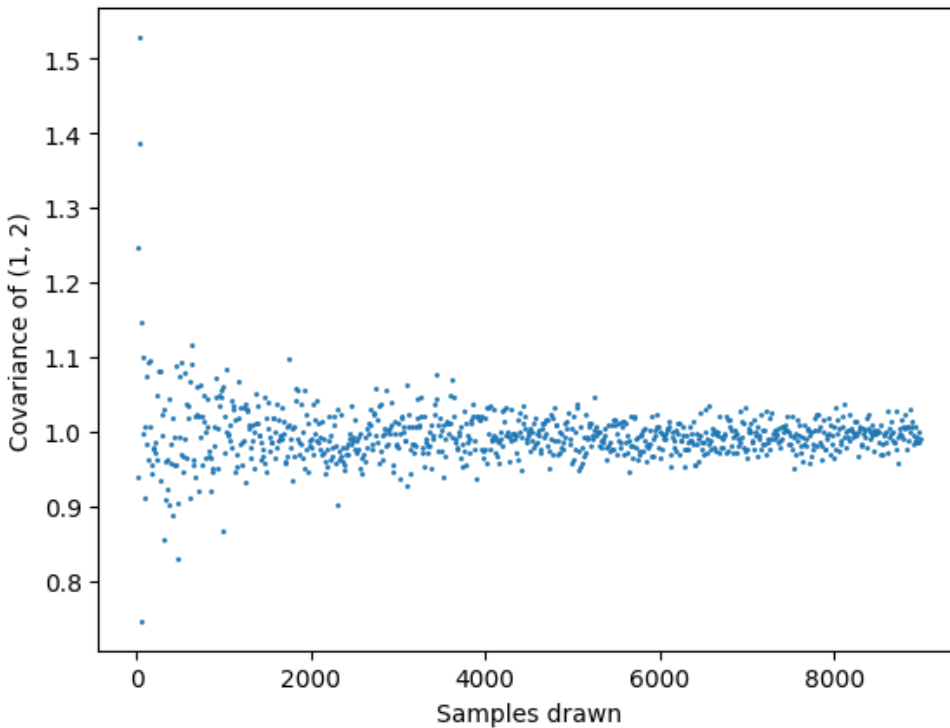
```python
cov = [[1,.005,.005],
       [.005,1,.995],
       [.005,.995,1]]
means = [0,0,0]
samples = 10
# Record the values and show that est_cov converges to the actual values in the covariance
matrix
sample_size = []
actual_cov = []
while(samples < 9e3):
    # Draw Samples from the actual matrix, into a column vector
    dist = pd.DataFrame(data = np.random.multivariate_normal(means, cov, samples))
    #estimate the covariance matrix
    cov_est = dist.cov()
    sample_size.append(samples)
```

```
    actual_cov.append(cov_est[1][2])
    samples += 10
plt.scatter(x = sample_size, y = actual_cov, s = 1)
plt.show()
```

Running the script we get the following scatter plot, which demonstrates convergence:

The Scatter plot clearly demonstrates that as we draw more samples and determine values for covariance, we converge to the actual covariance.
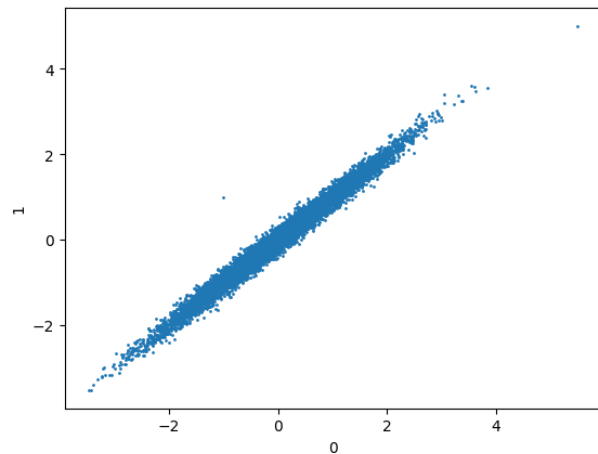
Problem 2:

First, we use a scatter plot to plot the two features of DF2

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd

df2 = pd.read_csv("DF2", index_col = 0)
df2.head(10)
df1.plot.scatter(x = '0', y = '1',s = 1)
```
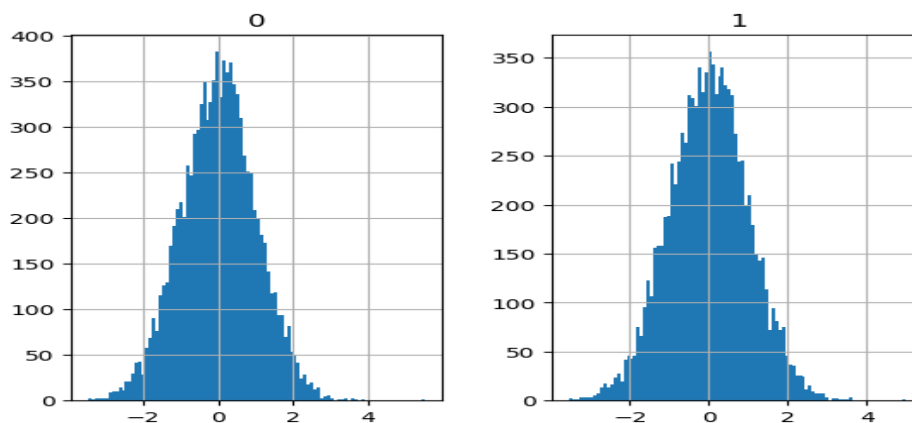
We can intuitively surmise that the left outlier (-1, 1) is 'more different' than the right outlier (5.5, 5).

Furthermore, plotting the features shows that both are gaussian:
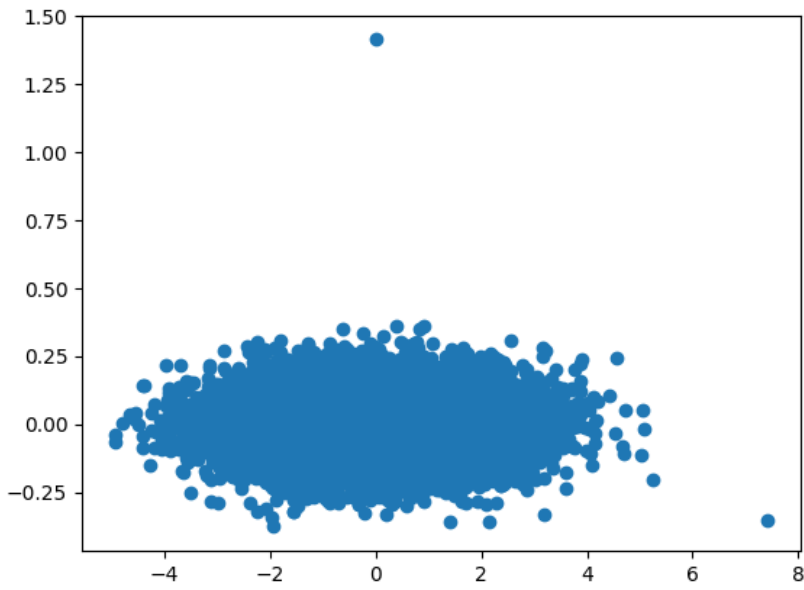
```
df2.hist(bins = 100)
```


We clearly are dealing with a multivariate gaussian. If we were to project the original data onto the eigenspace formed by the multivariate gaussian, we can identify outliers more easily.
Observe:

```
e_val, e_vec = np.linalg.eig(df2.cov())
projected = df2@e_vec
plt.scatter(projected[0], projected[1])
```

We see that the original deviator clearly deviates from the projection more than the other.

Problem 3:

The following defines the function that returns the k most popular names from a given year:

```python
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np

def popular_names(k, year):
    # Open the appropriate file
    df = pd.read_csv("Names/yob" + str(year) + ".txt", header = None)
    # Determine the k most popular names
    pop_names = []
    for i in range(len(df)):
        pop_names.append([i, df[2][i]])
    pop_names.sort(key = lambda x: x[1])
    names = []
    for i in range(len(df) - 1, len(df) - k - 1, -1):
        names.append(df[0][pop_names[i][0]])
    return names
```

When we run the following:

```python
popular_names(5, year = 1951)
popular_names(5, year = 2013)
```

We get the following output:

```python
['James', 'Robert', 'John', 'Linda', 'Michael']
```

```
['Sophia', 'Emma', 'Olivia', 'Noah', 'Liam']
```

For the next algorithm, we wrote a function that takes a given name and returns the frequency of that name for each year, for each sex. The returned data structure is a 2-D dictionary accessed like the following:

```
Name_freq[(Sex)][(Year)]
```

Here is the code

```python
def sex_name_counts(name):
    counts = {"Men" : {},  "Women" : {}}
    # For each year
    for i in range(1880, 2015 + 1):
    # Open the corresponding file
        df = pd.read_csv("Names/yob" + str(i) + ".txt", header = None)
        # Find the columns with name "name"
        df = df[df[0] == name]
        for j in range(len(df)):
            if df.iloc[j,1]== 'M':
                counts["Men"][str(i)]  = df.iloc[j,2]
            else:
                counts["Women"][str(i)]  = df.iloc[j,2]
    return counts
```

When we run:

```python
madison_names = sex_name_counts(name = "Madison")
madison_names["Women"]["1999"]
```

We get the following output:

```
18052
```

For the third algorithm, we calculated the total number of names for each year and stored it in an array; then we used that information to again store a 2-D dictionary frequency, but this time its relative.

First:

```python
# Calculate the total names for each year
totalNames = [0 for i in range(2015 + 1 - 1880)]
for i in range(0, (2015 + 1 - 1880)):
    # Open the file
    df = pd.read_csv("Names/yob" + str(1880 + i) + ".txt", header = None)
    total = 0
    for j in range(len(df)):
```

```
        total += df.iloc[i,2]
    totalNames[i] = total
```

Then the function:

```python
def rel_freq(name):
    counts = {"Men" : {},  "Women" : {}}
    # Iterate through each year
    for i in range(1880, 2015 + 1):
        # Read the file
        df = pd.read_csv("Names/yob" + str(i) + ".txt", header = None)
        # Isolate by name
        df = df[df[0] == name]
        for j in range(len(df)):
            if df.iloc[j, 1] == "M":
                counts["Men"][str(i)] = df.iloc[j,2] / totalNames[i - 1880]
            else:
                counts["Women"][str(i)] = df.iloc[j,2] / totalNames[i - 1880]
    return counts
```

We run the following:

```python
john_rel_freq = rel_freq(name = "John")
print("The frequency of johns per baby born in 1880", john_rel_freq["Men"]["1880"])
print("The frequency of johns per baby born in 1960", john_rel_freq["Men"]["1960"])
print("The frequency of johns per baby born in 2015", john_rel_freq["Men"]["2015"])
```

We get the following output:

```
The frequency of johns per baby born in 1880 0.0006832979476291578
The frequency of johns per baby born in 1960 0.0010859158522773277
The frequency of johns per baby born in 2015 0.000132373797393751
```

The final algorithm determines a set of names which represents the names that any point switched from being more popular with one sex to another.

```python
for i in range(1880, 2015 + 1):
    print(i)
    # Read the file
    df = pd.read_csv("Names/yob" + str(i) + ".txt", header = None)
    # Get the set of all the names from the dataframe
    names = set(df[0].unique())
    for name in names:
        rows = df.loc[df[0] == name]
        # If there is an entry for both sexes
```

```python
        dominant_sex = 'M'
        if len(rows) == 2:
            # Determine the greater sex
            dominant_sex  = rows.iloc[0, 1] if (rows.iloc[0,2] > rows.iloc[1,2]) else
rows.iloc[1, 1]
        else:
            dominant_sex = rows.iloc[0, 1]
        # If we have seen it before, check the last dominant, and note if it is different
        if name in name_switches and dominant_sex != name_switches[name]:
            switched_names.add(name)
        # If we have not seen it before note the sex
        else:
            name_switches[name] = dominant_sex
switched_names
```

Which aptly produced the following immense output:

{'Kierre', 'Anoop', 'Soe', 'Orva', 'Ricki', 'Jazari', 'Mckinsey', 'Beckett', 'Jensen', 'Ragan', 'Areen', 'Alby', 'Blessed', 'Memphis',
'Pranjal', 'Tristin', 'Demetrie', 'Hilary', 'Estle', 'Jasiyah', 'Nazareth', 'Davene', 'Quanah', 'Camarie', 'Seraphin', 'Tha', 'Cortez',
'Lennix', 'Weslie', 'Detric', 'Lasean', 'Karron', 'Ertis', 'Marshel', 'Raegan', 'Ara', 'Jwan', 'Graycin', 'Jandel', 'Perl', 'Jamison',
'Tran', 'Colyn', 'Merideth', 'Georg', 'Laury', 'Kamori', 'Soo', 'Rosell', 'Karrington', 'Edden', 'Ocie', 'Blaike', 'Berthal', 'Tacoma',
'Vandy', 'Moe', 'Allie', 'Jan', 'Royale', 'Giordan', 'Kalijah', 'Taji', 'Dondi', 'Shawan', 'Wriley', 'Carley', 'Mayo', 'Kimmie',
'Dilpreet', 'Sequoyah', 'Corliss', 'Shanne', 'Aza', 'Sri', 'Faran', 'Devian', 'Waldean', 'Neco', 'Tiegan', 'Tavonne', 'Akai', 'Gillie',
'Farren', 'Monico', 'Zaelyn', 'Delorian', 'Kimothy', 'Tajae', 'Riese', 'Christon', 'Arlis', 'Joddie', 'Adriene', 'Alexius', 'Meryle',
'Kylen', 'Keagyn', 'Rimas', 'Ivor', 'Makhari', 'Tiney', 'Shamarie', 'Krister', 'Mital', 'Sander', 'Khalee', 'Hser', 'Jemini', 'Yancy',
'Nealy', 'Lovern', 'Vernet', 'Jaydynn', 'Kyi', 'Clester', 'Bobie', 'Santi', 'Parminder', 'Lennie', 'Erie', 'Rhylin', 'Kiare', 'Matisse',
'Stacey', 'Dasmine', 'Tionne', 'Atlee', 'Chez', 'Julani', 'Soriya', 'Marshell', 'Kerin', 'Min', 'Rhythm', 'Fallon', 'Anmol', 'Darley',
'Gari', 'Keontay', 'Kyan', 'Aidynn', 'Cashlin', 'Nephtali', 'Armonee', 'Adebola', 'Dearion', 'Scotland', 'Reshawn', 'Rotem', 'Mccartney',
'Lorell', 'Fate', 'Aven', 'Valen', 'Harlowe', 'Quincey', 'Ijah', 'Nijah', 'Virgin', 'Nahid', 'Darriell', 'Leeor', 'Hala', 'Zani',
'Kylenn', 'Lennon', 'Trashawn', 'Ta', 'Michie', 'Haedyn', 'Janus', 'Holley', 'Kumari', 'Afsheen', 'Taylen', 'Shamaree', 'Carles',
'Shaquan', 'Kalani', 'Madden', 'Kalei', 'Savya', 'Nohea', 'Jaedyn', 'Davan', 'Brownie', 'Un', 'Jemmie', 'Amouri', 'Climmie', 'Maddyx',
'Tobey', 'Kierin', 'Zarin', 'Roche', 'Rya', 'Cashe', 'Riyaan', 'Yong', 'Telly', 'Shayvon', 'Cayse', 'Nicko', 'Maryland', 'Happy', 'Kyrie',
'Dristin', 'Osa', 'Real', 'Teagin', 'Ryce', 'Vere', 'Veral', 'Jaire', 'Cheyney', 'Montique', 'Tilar', 'Chae', 'Aba', 'Chaska', 'Clary',
'Cedar', 'Halen', 'Yanick', 'Diep', 'Gaberial', 'Ka', 'Ziel', 'Elwyn', 'Asonte', 'Deshaun', 'Traeh', 'Antwana', 'Callahan', 'Tanis',
'Jadence', 'Kendle', 'Keatyn', 'Jem', 'Redell', 'Chigozie', 'Clarke', 'Kodie', 'Marrin', 'Iley', 'Linley', 'Camil', 'Gurjot', 'Miley',
'Gabriele', 'Cameo', 'Billie', 'Bridge', 'Marquee', 'Rhyan', 'Donnie', 'Jessa', 'Pariss', 'Amaurie', 'Finau', 'Lyrik', 'Carlee', 'Vonnie',
'Haru', 'Sunny', 'Aziah', 'Psalms', 'Camiel', 'Jihan', 'Daney', 'Marin', 'Damoni', 'Shayron', 'Reve', 'Romelle', 'Bayly', 'Kayne', 'Orla',
'Keimoni', 'Micaiah', 'Dalis', 'Kamarii', 'Verneal', 'Klark', 'Soul', 'Yue', 'Shay', 'Juda', 'Joie', 'Kindel', 'Aurian', 'Corry',
'Sophanna', 'Sea', 'Cleaster', 'Eura', 'Zennie', 'Tylo', 'Garnell', 'Maciel', 'Arshia', 'Oluwatosin', 'Amanpreet', 'Whitley', 'Macaiah',

'Capree', 'Xiao', 'Lauris', 'Knightley', 'Shayne', 'Daris', 'Lenix', 'Xian', 'Alii', 'Loddie', 'Daryen', 'Farris', 'Zee', 'Barrie',
'Dee', 'Flory', 'Ansley', 'Mykel', 'March', 'Taris', 'Jimin', 'Mavin', 'Adi', 'Ishi', 'Khalis', 'Sakhi', 'Sathya', 'Darshan', 'Ventura',
'Kadynn', 'Shiah', 'Marice', 'Mical', 'Dorien', 'Zhane', 'Staley', 'Gerd', 'Avory', 'Cassady', 'Najja', 'Gaynor', 'Harnoor', 'Shajuan',
'Jance', 'Roye', 'Rosario', 'Breaun', 'Blu', 'Dayln', 'Senai', 'Rooney', 'Jasiri', 'Toye', 'Khiari', 'Deshonte', 'Indiana', 'Malikia',
'Brighton', 'Shirley', 'Krishi', 'Tenny', 'Dinnie', 'Dorcus', 'Yiran', 'Kionne', 'Bunny', 'Dae', 'Nyel', 'Embree', 'Pendleton', 'Harmeet',
'Kessler', 'Torryn', 'Avian', 'Zakariyah', 'Yanis', 'Lark', 'Tris', 'Fidelis', 'Kasey', 'Merit', 'Yari', 'Franc', 'Jolen', 'Janari',
'Imari', 'Athens', 'Kahlen', 'Sovereign', 'Stonie', 'Nova', 'Ibis', 'Steely', 'Amahri', 'Codee', 'Logen', 'Lamoni', 'Keran', 'Justyn',
'Bond', 'Senica', 'Lashawn', 'Samuelle', 'Gee', 'Mikayle', 'Tameron', 'Yarel', 'Keron', 'Masami', 'Jona', 'Jasmond', 'Kiryn', 'Ariya',
'Juri', 'Ryel', 'Dorrian', 'Leigh', 'Dakotta', 'Shamarr', 'Tanny', 'Jere', 'Demetrice', 'Teigen', 'Dacotah', 'Skyelar', 'Mekiah', 'Yamel',
'Dannie', 'Lael', 'Rendy', 'Gwynn', 'Reace', 'Cree', 'Olayinka', 'Deone', 'Medley', 'Karion', 'Cheron', 'Cam', 'Torance', 'Dossie',
'Phinley', 'Colbi', 'Tippy', 'Kalin', 'Cary', 'Sheril', 'Lany', 'Dilynn', 'Ratha', 'Tagan', 'Kevyn', 'Perris', 'Aly', 'Oshea', 'Arrion',
'Mosley', 'Santanna', 'Armanni', 'Franky', 'Daylynn', 'Edel', 'Ivie', 'Jamelle', 'Rhiley', 'Taigen', 'Xai', 'Shawndale', 'Jewelz',
'Rossi', 'Jaydenn', 'Abir', 'Essa', 'Eaden', 'Henri', 'Leslie', 'Levone', 'Rox', 'Mazi', 'Jaydeen', 'Shukri', 'Skylen', 'Skyy', 'Lindley',
'Elshaddai', 'Nocona', 'Vallen', 'Jermany', 'Page', 'Mardell', 'Kym', 'Honest', 'Sandy', 'Gay', 'Elvy', 'Kemonie', 'Venis', 'Kiari',
'Kennyatta', 'Jaquel', 'Graisyn', 'Storm', 'Luren', 'Arlin', 'Darrie', 'Conda', 'Shamik', 'Chinemerem', 'Jaziah', 'Graylin', 'Meba',
'Kobi', 'Aryn', 'Oluwaseyi', 'Devonne', 'Yandi', 'Cappy', 'Cartier', 'Kallen', 'Jobi', 'Rocklyn', 'Truc', 'Machenzie', 'Summer', 'Mikal',
'Loi', 'Zenith', 'Abrian', 'Emone', 'Graylyn', 'Khanh', 'Devone', 'Deshun', 'Adryan', 'Love', 'Victory', 'Coti', 'Juliani', 'Rhyse',
'Ashley', 'Jael', 'Jaydence', 'Angell', 'Mycah', 'Mani', 'Erian', 'Foy', 'Zamari', 'Montra', 'Summers', 'Chau', 'Almo', 'Waddie',
'Desmin', 'Cleon', 'Lorel', 'Mackinley', 'Mel', 'Sinceer', 'Nicco', 'Tommie', 'Willett', 'Skyler', 'Tatem', 'Donyea', 'Eldee', 'Rayme',
'Adrin', 'Jahnai', 'Tamron', 'Tajuan', 'Kery', 'Rashaun', 'Patt', 'Amory', 'Jaiden', 'Sagen', 'Artha', 'Mahari', 'Aireon', 'Macey',
'Bora', 'Rhemy', 'Jacquay', 'Tallis', 'Kandia', 'Krist', 'Braydee', 'Corren', 'Abbey', 'Vestal', 'Wavie', 'Reedie', 'Courtlin', 'Kellen',
'Lexington', 'Peris', 'Burnette', 'Ah', 'Carel', 'Karlin', 'Mickey', 'Xyion', 'Linzy', 'Wan', 'Zephyr', 'Finnie', 'Oluwatofunmi',
'Shellie', 'Arliss', 'Shamere', 'Karee', 'Kanyen', 'Wynne', 'Juddie', 'Schuylar', 'Jaiel', 'Mckinney', 'Jaquay', 'Chaning', 'Eddye',
'Thamar', 'Faris', 'Neko', 'Kamaurie', 'Nakie', 'Ovis', 'Keonta', 'Addington', 'Johany', 'Siu', 'Navdeep', 'Dilyn', 'Jaque', 'Jaki',
'Kirian', 'Avry', 'Brenyn', 'De', 'Oshai', 'Hildred', 'Lovelle', 'Ezzie', 'Samari', 'Videll', 'Themis', 'Calvary', 'Abney', 'Tamba',
'Dontia', 'Sian', 'Perrin', 'Cleophas', 'Hildreth', 'Tylee', 'Gaby', 'Christan', 'Leotis', 'Joanny', 'Galyn', 'Jasyah', 'Carrey',
'Harley', 'Osha', 'Felis', 'Kaelen', 'Cornie', 'Mor', 'Ordell', 'Idris', 'Dawsyn', 'Samuela', 'Bentli', 'Ruari', 'Prentiss', 'Dare',
'Azriel', 'Linder', 'Sklyer', 'Gene', 'Azaniah', 'Delijah', 'Randyl', 'Seiko', 'Lavelle', 'Malon', 'Wallie', 'Pilar', 'Mykelti', 'Golden',

'Snehal', 'Vernal', 'Jamey', 'Navjot', 'Montana', 'Santos', 'Fayette', 'Danney', 'Shamauri', 'Kolbey', 'Bai', 'Lenzie', 'Christy',
'Ocean', 'Wrigley', 'Shearl', 'Uzoma', 'Rien', 'Montie', 'Asten', 'Tian', 'Reda', 'Conlee', 'Eldean', 'Kiah', 'Darrein', 'Jewelian',
'Iria', 'Bernell', 'Taylor', 'Adair', 'Linnell', 'Welcome', 'Darnelle', 'Ravon', 'Kacyn', 'Pier', 'Dari', 'Dayle', 'Davee', 'Shaquane',
'Lu', 'Gabriyel', 'Sokhom', 'Aleph', 'Javae', 'Shaden', 'Arlyn', 'Elza', 'Rajdeep', 'Martie', 'Sherrell', 'Lessley', 'Kymari', 'Ladale',
'Arieon', 'Tyjai', 'Kaidynn', 'Haven', 'Kayse', 'Kenyotta', 'Tieran', 'Kristain', 'Henley', 'Darling', 'Lorren', 'Kailen', 'Teren',
'Jesy', 'Orea', 'Maycen', 'Tylei', 'Jame', 'Imon', 'Asie', 'Britten', 'Mishael', 'Makay', 'Donnelle', 'Karan', 'Leshawn', 'Somtochukwu',
'Anias', 'Audyn', 'Bernis', 'Credence', 'Sami', 'Jamy', 'Holly', 'Oyindamola', 'Codi', 'Vesper', 'Mishal', 'Giavanni', 'Elean', 'Skylur',
'Yani', 'Cletis', 'Terris', 'Brittian', 'Mico', 'Hilal', 'Brittain', 'Jade', 'Levie', 'Danta', 'English', 'Kelcey', 'Andree', 'Taylan',
'Sevan', 'Elliotte', 'Kennison', 'Krish', 'Rainey', 'Daley', 'Kearney', 'Laurell', 'Truth', 'Talyn', 'Rene', 'Cruz', 'Makell',
'Arrington', 'Rylin', 'Ercel', 'Ingram', 'Jonquil', 'Casey', 'Kasani', 'Joey', 'Modie', 'Amorie', 'Dresden', 'Astin', 'Yarden', 'Akira',
'Kindle', 'Syan', 'Luise', 'Daily', 'Bennette', 'Chayan', 'Aries', 'Daniele', 'Jaime', 'Bostyn', 'Addis', 'Mychel', 'Bentlee', 'Fiori',
'Daly', 'Ehrin', 'Melvine', 'Deshan', 'Dandy', 'Colbey', 'Chavon', 'Moyosoreoluwa', 'Chade', 'Kerrion', 'Tateum', 'Marce', 'Jules', 'Fay',
'Ernie', 'Chong', 'Stevy', 'Myrel', 'Velvet', 'Laverle', 'Cambridge', 'Mell', 'Traice', 'Sanay', 'Karlen', 'Shelvie', 'Alexie', 'Numa',
'Laren', 'Ashland', 'Elzie', 'Cailan', 'Ange', 'Jer', 'Thienan', 'Camaro', 'Deion', 'Kadyn', 'Teagen', 'Kylian', 'Kazi', 'Ellery',
'Jiayi', 'Sa', 'Lorain', 'Anay', 'Adley', 'Jiwoo', 'Ferran', 'Micha', 'Idel', 'Breonte', 'Waverley', 'Bird', 'Brannigan', 'Roshon',
'Clancy', 'Prabhnoor', 'Berdell', 'Lunden', 'Temitope', 'Sully', 'Durelle', 'Winslow', 'Valgene', 'Rejean', 'Tresor', 'Offie', 'Kamalei',
'Channin', 'Aryian', 'Zyian', 'Jayel', 'Majestic', 'Nery', 'Ariez', 'Oswin', 'Orlanda', 'Elvi', 'Andrian', 'Leshan', 'Excel', 'Martelle',
'Ruey', 'Jacinth', 'Sakai', 'Carle', 'Copper', 'Keante', 'Odia', 'Avyn', 'Callen', 'Jacque', 'Harsimran', 'Seraph', 'Brook', 'Corky',
'Germaine', 'Cedell', 'Paysen', 'Krys', 'Adrean', 'Ovie', 'Opie', 'Loren', 'Kiren', 'Keyunta', 'Ilhan', 'Nay', 'Bao', 'Sham', 'Darrean',
'Lindy', 'Armoni', 'Roni', 'Nylen', 'Runako', 'Lawren', 'Cris', 'Sonni', 'Ibukunoluwa', 'Lexie', 'Lavan', 'Jimie', 'Saylor', 'Caidyn',
'Cailen', 'Commie', 'Soua', 'Timber', 'Kimani', 'Shirly', 'Ardean', 'Azhar', 'Kanai', 'Slone', 'Dushon', 'Cambell', 'Tanish', 'Dynell',
'Eslie', 'Tallie', 'Chanel', 'Dany', 'Aren', 'Rommy', 'Lemoyne', 'Honore', 'Regen', 'Michah', 'Dreamer', 'Sehaj', 'Algie', 'Jeffrie',
'Dylin', 'Kweli', 'Kem', 'Xue', 'Buff', 'Chandler', 'Pearley', 'Luzell', 'Kayler', 'Jammie', 'Chidera', 'Cache', 'Courtenay', 'Tamarr',
'Blakeley', 'Brees', 'Johann', 'Chevelle', 'Ozel', 'Posie', 'Jordyan', 'Skyller', 'Sharn', 'Cameran', 'Tylin', 'Jontel', 'Odie', 'Jovonn',
'Davi', 'Ly', 'Alver', 'Deon', 'Uchechukwu', 'Ravin', 'Zebbie', 'Thayer', 'Tacori', 'Velmar', 'Rajae', 'Leith', 'Brenn', 'Jermani',
'Ching', 'Bo', 'Emari', 'Chanon', 'Ariyan', 'Harbor', 'Suan', 'Rhylan', 'Patsey', 'Nichola', 'Skeeter', 'Avery', 'Jaydyn', 'Quincee',
'Haydenn', 'Kimari', 'Taygen', 'Kendis', 'Bria', 'Jovi', 'Narvie', 'Ronell', 'Gail', 'Kendel', 'Alin', 'Taelin', 'Oluwatomisin', 'Elya',
'Gwendell', 'Kache', 'Ellison', 'Erice', 'Farrell', 'Bee', 'Jole', 'Garyn', 'Addison', 'Shaylon', 'Gerry', 'Arleigh', 'Jaquae', 'Sovanna',
'Palmer', 'Thuong', 'Kamani', 'Aarian', 'Burnett', 'Darly', 'Bevan', 'Toshua', 'Lorrain', 'Tajai', 'Albany', 'Jahmiah', 'Carmon', 'Emon',
'Fatin', 'Shamair', 'Narayana', 'Malone', 'Artee', 'Agape', 'Tallyn', 'Jaice', 'Tobie', 'Shamichael', 'Jacyn', 'Bracey', 'Jen', 'Kairy',
'Lace', 'Myrl', 'Aroosh', 'Infant', 'Mckel', 'Lougene', 'Adel', 'Verdis', 'Jency', 'Corris', 'Stevee', 'Karmon', 'Hyun', 'Aimar', 'Ore',
'Arien', 'Haiven', 'Shola', 'Shing', 'Doua', 'Elian', 'Kayland', 'Reyes', 'Donshae', 'Kire', 'Revyn', 'Emerson', 'Torii', 'Amil',
'Lavone', 'Shamell', 'Dani', 'Reny', 'Ashlin', 'Aldean', 'Dominquie', 'Kimble', 'Talbot', 'Nanda', 'Quinn', 'Kelynn', 'Jowell',
'Messiyah', 'Shion', 'Jandy', 'Laurie', 'Ersel', 'Chalon', 'Semon', 'Cai', 'Andie', 'Abraxas', 'Syree', 'Brookes', 'Adna', 'Detrich',
'Chaka', 'Johan', 'Zaiah', 'Duffie', 'Chimere', 'Ronie', 'Cyan', 'Kara', 'Edy', 'Danyal', 'Kayle', 'Bianco', 'Zi', 'Jerzy', 'Malikah',
'Amyre', 'Kayo', 'Loy', 'Amery', 'Sherril', 'Kazu', 'Dah', 'Phoenixx', 'Yuchen', 'Leighton', 'Mclaren', 'Airon', 'Damaria', 'Muril',
'Noha', 'Carmie', 'Aris', 'Arona', 'Danne', 'Gianny', 'Shawndell', 'Kwanzaa', 'Junnie', 'Lavern', 'Julis', 'Merel', 'Key', 'Eh',
'Kashmir', 'Earlie', 'Ismar', 'Cidney', 'Kemani', 'Shady', 'Toriana', 'Jewell', 'Kalen', 'Laroyce', 'Sheldyn', 'Quilla', 'Trine', 'Rihan',
'Ajae', 'Teran', 'Graceson', 'Lydell', 'Rickie', 'Coby', 'Emry', 'Inioluwa', 'Alyric', 'Oree', 'Whitney', 'Lejeune', 'Tarin', 'Olle',
'Imo', 'Shamonte', 'Blakelee', 'Dondrea', 'Jazaiah', 'Dominek', 'Mickie', 'Ioan', 'Temari', 'Robben', 'Larell', 'Malijah', 'Taydem',
'Chrys', 'Bryann', 'Sarang', 'Devinn', 'Reylin', 'Amzie', 'Ayrion', 'Consepcion', 'Mykael', 'Kit', 'Elice', 'Quinnie', 'Skylier',
'Jailin', 'Daryn', 'Aldyn', 'Onnie', 'Arly', 'Tziah', 'Caroll', 'Starley', 'Jayde', 'Yeshia', 'Mali', 'Christain', 'Kunga', 'Soma',
'Marx', 'Braxtyn', 'Briley', 'Finnley', 'Yamani', 'Anshu', 'Vonn', 'Gradie', 'Meng', 'Da', 'Tinsley', 'Azizi', 'Del', 'Chen', 'Larelle',
'Peniel', 'Munachiso', 'Shaune', 'Martine', 'Kenley', 'Oluwanifemi', 'Lamoine', 'Shamone', 'Amzi', 'Tieler', 'Nakari', 'Anjel', 'Myan',
'Jamine', 'Jasey', 'Asheton', 'Tee', 'Brit', 'Raevon', 'Nigel', 'Sakari', 'Beverly', 'Jermanie', 'Jee', 'Taiwo', 'Krishaun', 'Ecko',
'Jeremya', 'Hannon', 'Macheal', 'Chyler', 'Jas', 'Shiloh', 'Ardie', 'Roshun', 'Ardine', 'Amaziah', 'Lin', 'Indy', 'Britian', 'Collie',
'Coty', 'Kerian', 'Hally', 'Breylin', 'Cena', 'Shuron', 'Sherill', 'Lakota', 'Eddis', 'Si', 'Vearl', 'Jaylyne', 'Asante', 'Daryian',
'Amel', 'Maika', 'Rilley', 'Mckenzy', 'Tyrea', 'Dorsie', 'Joon', 'Mercury', 'Ivis', 'Jerol', 'Ireland', 'Shadow', 'Nakota', 'Jaree',
'Rauri', 'Lindsay', 'Yoshimi', 'Morgan', 'Creedance', 'Remy', 'Dominique', 'Loel', 'Dail', 'Atlas', 'Amarin', 'Vanny', 'Kelley', 'Jesee',
'Monell', 'Cortlyn', 'Laray', 'Roshan', 'Oluwatomi', 'Denni', 'Eriyon', 'Shawndel', 'Rain', 'Idrissa', 'Sherron', 'Arnell', 'Phalon',
'Kaylor', 'Illinois', 'Phalen', 'Gurpreet', 'Lanel', 'Jovanne', 'Mikele', 'Kashmere', 'Salud', 'Emeral', 'Keyon', 'Carnell', 'Kristian',
'Gwinn', 'Kirin', 'Murel', 'Nana', 'Perryn', 'Sherrill', 'Pressley', 'Parish', 'Joa', 'Chastain', 'Rashawn', 'Life', 'Jawan', 'Adyn',
'Lorenza', 'Ryley', 'Kendall', 'Bralen', 'Donique', 'Aaris', 'Stanlee', 'Deaveon', 'Damonie', 'Shaddai', 'Seraphim', 'Finley', 'Rajah',
'Rashi', 'Swan', 'Ekene', 'Argelis', 'Lohgan', 'Aubery', 'Cordae', 'Vinci', 'Memphys', 'Yannis', 'Arnie', 'Li', 'Zeal', 'Lo', 'Deonne',
'Deryn', 'Monserrate', 'Tobbie', 'Kionte', 'Kelijah', 'Larkin', 'Jama', 'Channing', 'Ive', 'Oluwatamilore', 'Braxlee', 'Merrit', 'Michae',
'Laylan', 'Britt', 'Shalen', 'Meron', 'Arrin', 'Aliyan', 'Bly', 'Averill', 'Tamare', 'Larie', 'Ragen', 'Tao', 'Mykeal', 'Tarae', 'Farrin',
'Se', 'Maison', 'Arbor', 'Coren', 'Yandy', 'Charle', 'Toy', 'Maxie', 'Ivel', 'Lesly', 'Star', 'Marquelle', 'Ferrel', 'Moxley', 'Paxtyn',
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'Jonta', 'Luckie', 'Tavish', 'Jerre', 'Jacquese', 'Darriel', 'Lyndall', 'Teigan', 'Jamile', 'Michiah', 'Su', 'Domineque', 'Camren',
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'Justise', 'Sherell', 'Raylee', 'Kevi', 'Haylen', 'Azeriah', 'Kalle', 'Lashun', 'Elree', 'Brier', 'Jaloni', 'Dosie', 'Shaughnessy',
'Wilmoth', 'Kahler', 'Jari', 'Loney', 'Nor', 'Ascension', 'Psalm', 'Junis', 'Amanti', 'Cher', 'Jerris', 'Lafon', 'Orrie', 'Ivey',
'Othell', 'Ridha', 'Sayre', 'Areon', 'Samauri', 'Lacy', 'Esosa', 'Sekai', 'Theryn', 'Kerry', 'Freedom', 'Skylor', 'Mikko', 'Cledith',
'Auren', 'Arzell', 'Vada', 'Hoa', 'Tyjah', 'Arba', 'Derrie', 'Coda', 'Chun', 'Allex', 'Shinya', 'Aamari', 'Deni', 'Reggie', 'Meiko',
'Sincere', 'Brye', 'Leaster', 'Aidyn', 'Macaire', 'Markai', 'Jostyn', 'Remey', 'Ariyon', 'Semaj', 'Kang', 'Clennie', 'Jaylin', 'Bergen',
'Percie', 'Kolya', 'Ermine', 'Ramsay', 'Cayce', 'Lacey', 'Jacquell', 'Kahlan', 'Ya', 'Lay', 'Maesen', 'Harmanpreet', 'Yacine', 'Zo',
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'Trysten', 'Braylyn', 'Nazari', 'Neely', 'Cayton', 'Chane', 'Weslyn', 'Ayomikun', 'Mc', 'Onie', 'Orr', 'Karmel', 'Kameran', 'Bristin',
'Donie', 'Lynell', 'Terrin', 'Tracy', 'Apurva', 'Demetre', 'Chanler', 'Tagen', 'Brette', 'Claudie', 'Grier', 'Ajene', 'Worthy', 'Pele',
'Quian', 'Cosby', 'Earnie', 'Verlynn', 'Jaqualyn', 'Lavonn', 'Dessiah', 'Braelin', 'Katin', 'Tasi', 'Lewellyn', 'Michi', 'Iman', 'Avis',
'Rossie', 'Allison', 'Ge', 'Nathel', 'Miko', 'Early', 'Tahje', 'Gale', 'Euriah', 'Gwyn', 'Arrow', 'Maysen', 'Ale', 'Deane', 'Evon',
'Cozy', 'Berkley', 'Oney', 'Kona', 'Glyndon', 'Oluwadarasimi', 'Future', 'Raynell', 'Khalyn', 'Jerusalem', 'Evann', 'Akie', 'Wei',
'Wydell', 'Oddie', 'Angle', 'Ovell', 'Naki', 'Money', 'Elgia', 'Lai', 'Algene', 'Kindall', 'Maxi', 'Nairobi', 'Joal', 'Gin', 'Korbyn',
'Maisen', 'Darris', 'Ather', 'Aubin', 'Maron', 'Delancey', 'Beni', 'Kellan', 'Armer', 'Torry', 'Kimber', 'Linzey', 'Mickell',
'Victorious', 'Emsley', 'Jujuan', 'Arrian', 'Taijae', 'Nghi', 'Brionne', 'Tyran', 'Lenyx', 'Sneh', 'Jessel', 'Shyne', 'Dann', 'Elvie',
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'Briane', 'Clancey', 'Merley', 'Daun', 'Rell', 'Bailyn', 'Arian', 'Norvelle', 'Coma', 'Ervie', 'Reyan', 'Dawnte', 'Juel', 'Espie',
'Myril', 'Orise', 'Kerrington', 'Unnamed', 'Australia', 'Colbee', 'Breck', 'Yang', 'Kiante', 'Gagandeep', 'Adryn', 'Wynn', 'Glenny',

'Vallon', 'Eurie', 'Verdell', 'Jahara', 'Olice', 'Jonnie', 'Vollie', 'Kelcy', 'Ker', 'Carlin', 'Jordin', 'Lotis', 'Jaton', 'Sol', 'Ival',
'Ireon', 'Paulie', 'Dickie', 'Emerald', 'Lorry', 'Nima', 'Quanta', 'Amarea', 'Armani', 'Terryn', 'Bertice', 'Hero', 'Loye', 'Chan',
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'Jammy', 'Devan', 'Margene', 'Io', 'Prue', 'Arel', 'Dakodah', 'Meritt', 'Vegas', 'Oluwadamilola', 'Johntae', 'Rothana', 'Bonell', 'Kimi',
'Rainn', 'Kamdyn', 'Chelsea', 'Kylar', 'Niko', 'Mong', 'Azari', 'Dekota', 'Demauria', 'Paddy', 'Aijalon', 'Preet', 'Kyri', 'Edi',
'Amauri', 'Gold', 'Brendell', 'Lennell', 'Rosean', 'Challis', 'Deshay', 'Sabriel', 'Charone', 'Roben', 'Kippy', 'Armanie', 'Luan',
'Gracin', 'Theoda', 'Orlie', 'Shondale', 'Corrin', 'Lenox', 'Carris', 'Keilen', 'Taymar', 'Arryn', 'Houa', 'Tahjae', 'Jadyne', 'Tamari',
'Zekiah', 'Leal', 'Lisle', 'Gurkirat', 'Maven', 'Afton', 'Velmer', 'Natividad', 'Neylan', 'Vali', 'Riece', 'Donnis', 'Kayan', 'Hau',
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'Ardel', 'Clemmie', 'Kamaree', 'Bobbye', 'Nissan', 'Murl', 'Marjon', 'Seena', 'Saman', 'Jadenn', 'Kitt', 'Bemnet', 'Dariell', 'Sai',
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'Delancy', 'Sani', 'Demaria', 'Aviyon', 'Yarnell', 'Sonam', 'Jazmond', 'Cuba', 'Lenyn', 'Gaelen', 'Kyrin', 'Opeyemi', 'Damie', 'Gates',
'Davonne', 'Elon', 'Mauri', 'Ridgely', 'Azel', 'Jonell', 'Harlee', 'Luvern', 'Nesly', 'Laetyn', 'Tegan', 'Nike', 'Londen', 'Sibley',
'Larken', 'Nebraska', 'Merle', 'Kha', 'Germany', 'Khamryn', 'Aldie', 'Deondrea', 'Jarie', 'Linsey', 'Ozie', 'Gurnoor', 'Agam', 'Kamsi',
'Byntlee', 'Lindsy', 'Val', 'Patterson', 'Rue', 'Yuki', 'Zihan', 'Dusty', 'Ivory', 'Ercell', 'Ekam', 'Carlisle', 'Choice', 'Michaele',
'Rami', 'Daurice', 'Adason', 'Esly', 'Dontavia', 'Karsen', 'Marvie', 'Alley', 'Meko', 'Kahlin', 'Lavell', 'Vertis', 'Lyndal', 'Larsen',
'Majd', 'Nijay', 'Hermie', 'Avante', 'Cyrille', 'Chayse', 'Wyn', 'Estel', 'Mati', 'Kenni', 'Emauri', 'Mannon', 'Curlie', 'Veryl',
'Devine', 'Fenix', 'Lyndol', 'Madyx', 'Donye', 'Gearl', 'Romie', 'Ala', 'Madrid', 'Raylin', 'Dannel', 'Crosley', 'Aquilla', 'Alpha',
'Tishawn', 'Lugene', 'Justiss', 'Brunell', 'Poe', 'Dali', 'Tramaine', 'Adean', 'Jakaylin', 'Mckinly', 'Mabry', 'Bay', 'Christin',
'Lyndale', 'Koren', 'Waver', 'Tabor', 'Khouri', 'Jordi', 'Maize', 'Delyn', 'Nyre', 'Sina', 'Guthrie', 'Tinashe', 'Jericho', 'Vondell',
'Mikhal', 'Halley', 'Dru', 'Diarra', 'Dalys', 'Every', 'Garie', 'Johnell', 'Geral', 'Najay', 'Willer', 'Sarom', 'Germain', 'Yinessa',
'Rotha', 'Shelvy', 'Kazumi', 'Clemence', 'Verl', 'Marke', 'Francesc', 'Merritt', 'Kaydn', 'Veril', 'Lanny', 'Nemiah', 'Jamesyn', 'Colbie',
'Lavon', 'Elzia', 'Massey', 'Deaundra', 'Jule', 'Kendre', 'Layke', 'Ordie', 'Ameya', 'Billyjo', 'Kinnie', 'Doney', 'Troyce', 'Hargun',
'Maxey', 'Juni', 'Torre', 'Kaname', 'Sehej', 'Enes', 'Rhemi', 'Ozell', 'Odel', 'Kish', 'Amarii', 'Mearle', 'Ebba', 'Nalin', 'Swayze',
'Kiko', 'Harjot', 'Lesslie', 'Leotha', 'Adeyinka', 'Anner', 'Fontaine', 'Andra', 'Beryle', 'Zalyn', 'Munachi', 'Haram', 'Bayan', 'Lupe',
'Ysabel', 'Danie', 'Layle', 'Jemiah', 'Joshlin', 'Karon', 'Berlie', 'Lakoda', 'Lochlyn', 'Kauri', 'Linzie', 'Holland', 'Phoenix',
'Shandy', 'Tiki', 'Dmani', 'Doral', 'Tyme', 'Jahzeel', 'Kameryn', 'Charley', 'Rowen', 'Elham', 'Mckenley', 'Myran', 'Ardis', 'Sok',
'Karna', 'Deshante', 'Rayshawn', 'Alexiel', 'Amori', 'Pharon', 'Abba', 'Novis', 'Wendolyn', 'Shawnell', 'Kili', 'Hollie', 'Eran',
'Kendal', 'Natha', 'Ajalon', 'Mizan', 'Lyndel', 'Keani', 'Maitreya', 'Breslin', 'Ryin', 'Loral', 'Jadeen', 'Chandar',
'Oluwatise', 'Lennis', 'Karrol', 'Chancie', 'Demaree', 'Dareen', 'Alija', 'Mako', 'Chene', 'Unk',
'Clevie', 'Tandy', 'Lien', 'Emary', 'Michell', 'Tayen', 'Javone', 'Peni', 'Rhyen', 'Tu', 'Riel', 'Ura',
'Dayan', 'Mendy', 'Garlyn', 'Murphy', 'Gayl', 'Perrie', 'Domingue', 'Ako', 'Tal', 'Vergil', 'Kadian',
'Jhai', 'Adoniah', 'Bentlei', 'Kayde', 'Ayo', 'Addy', 'Norell', 'Khamani', 'Lunnie', 'Mirl', 'Keller',
'Jensy', 'Skilar', 'Koa', 'Neddie', 'Mackenzie', 'Chandara', 'Pernell', 'Lajuan', 'Emlyn', 'Lashaw',
'Zoel', 'Rayen', 'Jamell', 'London', 'Shadee', 'Shinobu', 'Phenix', 'Kingslee', 'Tarren', 'Tyronza', 'Lamari', 'Jasmon', 'Dakotah',
'Armanii', 'Kailand', 'Chastin', 'Eppie', 'Freddie', 'Nicola', 'Roi', 'Tola', 'Bailey', 'Romani', 'Emmanuelle', 'Haroldean', 'Lawan',
'Esa', 'Giani', 'Jode', 'Edner', 'Tione', 'Surya', 'Shaya', 'Marley', 'Shu', 'Anael', 'Hyland', 'Shamire', 'Abimbola', 'Dashell', 'Lauri',
'Cayle', 'Tamer', 'Cristan', 'Hien', 'Jontae', 'Ashden', 'Keymoni', 'Chyenne', 'Brazil', 'Shawne', 'Osceola', 'Marte', 'Pheonix', 'Tien',
'Jupiter', 'Yali', 'Simar', 'Dary', 'Paz', 'Amran', 'Murphey', 'Dillyn', 'Ling', 'Encarnacion', 'Chawn', 'Chantra', 'Lian', 'Jene',
'Clydie', 'Olie', 'Eudell', 'Lind', 'Keyontae', 'Tru', 'Erbie', 'Kamrin', 'Lake', 'Jessey', 'Jhayden', 'Donyae', 'Sharman', 'Timmie',
'Cairo', 'Sumner', 'Edris', 'Tarrell', 'Jovon', 'Dayl', 'Shenan', 'Ti', 'Demetris', 'Stace', 'Nicky', 'Stevie', 'Win', 'Stirling',
'Mykell', 'Shaylan', 'Donae', 'Amando', 'Kaedynn', 'Destyn', 'Jorryn', 'Toki', 'Logyn', 'Zeddie', 'Valjean', 'Kymoni', 'Norvell',
'Cordie', 'Sony', 'Marcelle', 'Cleotha', 'Jesie', 'Findley', 'Camani', 'Syren', 'Nesbit', 'Waylynn', 'Alee', 'Shaquell', 'Ronda', 'Ash',
'Terren', 'Laurin', 'Jaryn', 'Hager', 'Manmeet', 'Amari', 'Jaquise', 'Orie', 'Shie', 'Ko', 'Aaryn', 'Finnly', 'Jann', 'Caro', 'Raheel',
'Deshane', 'Valery', 'Macari', 'Dahn', 'Gertis', 'Donzell', 'Erine', 'Keaire', 'Jermyah', 'Khyrie', 'Raffie', 'Hany', 'Montrese', 'Neng',
'Morgon', 'Chevie', 'Sinclair', 'Jaazaniah', 'Tae', 'Arlynn', 'Dejon', 'Marzell', 'Fain', 'Darian', 'Dao', 'Success', 'Kristien',
'Marchell', 'Charleston', 'Phan', 'Yoni', 'Nico', 'Yarrow', 'Dashane', 'Murriel', 'Breyan', 'Adison', 'Solace', 'Davie', 'Rozell', 'Coey',
'Keylin', 'Brandis', 'Bobby', 'Sky', 'Audi', 'Saje', 'Seton', 'Mashawn', 'Riven', 'Kenndy', 'Jasmeet', 'Doyne', 'Tollie', 'Nyia', 'Taj',
'Kairee', 'Rexie', 'Ellington', 'Kolbie', 'Ercil', 'Joan', 'Dalas', 'Aari', 'Mclane', 'Montrose', 'Alfonsa', 'Yi', 'Deniz', 'Issie',
'Jaskirat', 'Tannis', 'Samon', 'Marvis', 'Ilo', 'Shanon', 'Nyjah', 'Ski', 'Erlin', 'Sophear', 'Cire', 'Lyndell', 'Verble', 'Lovely',
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'Pink', 'Mekel', 'Sunday', 'Jonny', 'Wonnie', 'Amaree', 'Ashanti', 'Eastyn', 'Ashay', 'Meredith', 'Damarea', 'Arreon', 'Cleary', 'Alla',
'Quan', 'Drelynn', 'Puneet', 'Larrie', 'Kriss', 'Romney', 'Shiraz', 'Chisom', 'Brandel', 'Alonzia', 'Caylon', 'Emra', 'Kayon', 'Mckinley',
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'Danis', 'Bravery', 'Kimmy', 'Tarrin', 'Byrl', 'Corda', 'Lawrene', 'Maclaine', 'Kiran', 'Jaz', 'Kinsey', 'Lavalle', 'Berlyn', 'Kamorie',
'Vannie', 'Mishon', 'Martrice', 'Garcia', 'Aalijah', 'Dewie', 'Nashawn', 'Ryna', 'Semaje', 'Fernie', 'Salome', 'Ashe', 'Robbe', 'Bev',
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'Murlyn', 'Breece', 'Roshaun', 'Challie', 'Hastings', 'Sydney', 'Deivion', 'Kennie', 'Brittin', 'Artemis', 'Cassidy', 'Sidney', 'Hikaru',
'Camaree', 'Gordie', 'Shadie', 'Jeylen', 'Kenna', 'Aarin', 'Dalyn', 'Arrie', 'Raney', 'Raleigh', 'Kiree', 'Jante', 'Tenzin', 'Alai',
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'Timari', 'Dabney', 'Texas', 'Kam', 'Tennell', 'Dell', 'Glennis', 'Yarin', 'Stevey', 'Keimani', 'Alvia', 'Jody', 'Samie', 'Destri',
'Jacole', 'Haddy', 'Koty', 'Azarya', 'Kentlee', 'Deshon', 'Atreya', 'Zuri', 'Sharan', 'Perlie', 'Odene', 'Jurell', 'Gwin', 'Kency',
'Amary', 'Deven', 'Vernis', 'Kelly', 'Kene', 'Bronnie', 'Bradie', 'Dannon', 'Jaya', 'Maclyn', 'Alix', 'Lawsyn', 'Kinley', 'Jazmon',
'Oval', 'Charlemagne', 'Adriann', 'Brae', 'Tonee', 'Coree', 'Truby', 'Hermon', 'Perle', 'Carmin', 'Hollister', 'Vader', 'Aoi', 'Jamaine',
'Tolulope', 'Tyrie', 'Santana', 'Khris', 'Terrylee', 'Jamoni', 'Willet', 'Sheryl', 'Farin', 'Kodee', 'Nil', 'Raily', 'Dashel', 'Stacy',

'Loyce', 'Dennell', 'Kamil', 'Arya', 'Sabre', 'Kairi', 'Torence', 'Carrington', 'Mykale', 'Omotayo', 'Verne', 'Evern', 'Lear', 'Javonni',
'Barnell', 'Hilder', 'Melek', 'Tokunbo', 'Mccauley', 'Chey', 'Scottie', 'Doren', 'Maiko', 'Nasiah', 'Ayoola', 'Alexx', 'Neima', 'Devon',
'Bailor', 'Ayooluwa', 'Marvell', 'Kindell', 'Harlow', 'Micky', 'Darien', 'Myrle', 'In', 'Carry', 'Valentine', 'Denys', 'Robie', 'Ravneet',
'Taylin', 'Kelyn', 'Chevon', 'Merce', 'Almer', 'Troye', 'Toma', 'Shylo', 'Tai', 'Burnice', 'Lindsey', 'Jamae', 'Temidayo', 'Kawena',
'Jaren', 'Amillion', 'Haeven', 'Marlowe', 'Ting', 'Sung', 'Dian', 'Mallie', 'Torey', 'Rikki', 'Jeryn', 'Skiler', 'Rein', 'Shine', 'Revon',
'Luka', 'Breckin', 'Harumi', 'Joset', 'Kamerin', 'Jayonni', 'Zacaria', 'Berlin', 'Varnell', 'Dor', 'Karle', 'Marvel', 'Harlyn', 'Babe',
'Kadison', 'Camryn', 'Abiola', 'Wallis', 'Kymani', 'Benet', 'Dominque', 'Kallan', 'Eri', 'France', 'Lyric', 'Sherone', 'Demilade', 'Elmi',
'Notnamed', 'Brelyn', 'Karel', 'Amrit', 'Keating', 'Italy', 'Austine', 'Bernett', 'Lequan', 'Moran', 'Verle', 'Ziyan', 'Milan', 'Thelmer',
'Nyx', 'Rane', 'Carey', 'Tarrie', 'Hadley', 'Monti', 'Romi', 'Gentry', 'Nao', 'Artie', 'Cannie', 'Ursel', 'Song', 'Sahej', 'Argusta',
'Kishara', 'Johari', 'Riki', 'Lavette', 'Merl', 'Jonai', 'Lundy', 'Amarey', 'Lijah', 'Rannie', 'Donyell', 'Carlyle', 'Jodie', 'Remi',
'Shadi', 'Brittan', 'Lynnie', 'Reilley', 'Hilaire', 'Stormy', 'Nate', 'Quante', 'Tay', 'Tevis', 'Danyl', 'Ensley', 'Auguste', 'Shayon',
'Lutrell', 'Georgie', 'Meridith', 'Dannye', 'Mecca', 'Starling', 'Ermal', 'Clois', 'Ebbie', 'Laddie', 'Ethelbert', 'Sloane', 'Jarae',
'Laverl', 'Antiona', 'Ranell', 'Haben', 'Chosen', 'Braylin', 'Michele', 'Yoon', 'Zixuan', 'Orba', 'Lam', 'Breion', 'Deshawn', 'Raeden',
'Moo', 'Rise', 'Tolly', 'Nevel', 'Islam', 'Casy', 'Lyrick', 'Harlie', 'Janvier', 'Rorie', 'Parris', 'Iren', 'Lavert', 'Simranjit',
'Macayle', 'Cashmere', 'Abie', 'Myaire', 'Amisadai', 'Kaimi', 'Larue', 'Curlee', 'Briar', 'Devyn', 'Arta', 'Rande', 'Mathai', 'Kriston',
'Ariel', 'Chia', 'Daneal', 'Nakoma', 'Isia', 'Delane', 'Rivers', 'Auburn', 'Taren', 'Neftaly', 'Ayren', 'Gatlynn', 'Leshun', 'Jassiah',
'Broghan', 'Bless', 'Tochi', 'Loyalty', 'Dannell', 'Marquise', 'Beryl', 'Keaghan', 'Juneau', 'Kashi', 'Lanell', 'Ridley', 'Ludy',
'Jacquise', 'Keshawn', 'Wray', 'Leelynn', 'Burnes', 'Dailey', 'Alba', 'Ramiah', 'Noname', 'Malen', 'Kanari', 'Shamari', 'Tajay',
'Leshaun', 'Shakell', 'Deavin', 'Andriel', 'Calyx', 'Camari', 'Keyonta', 'Alter', 'Prabhjot', 'Fran', 'Arden', 'Bristen', 'Josha',
'Terryl', 'Robby', 'Kippie', 'Harrie', 'Haley', 'Renel', 'Southern', 'Gabryel', 'Jawon', 'Farron', 'Kristyan', 'Lashon', 'Halsey',
'Ferrin', 'Guadlupe', 'Suad', 'Rahi', 'Skyylar', 'Mckell', 'Tranell', 'Sun', 'Jaimeson', 'Chrisna', 'Reise', 'Wellesley', 'Xan', 'Arvi',
'Chatham', 'Lorrin', 'Kaegan', 'Zabdi', 'Donshay', 'Tally', 'Orlean', 'Autrey', 'Demitrice', 'Kenzie', 'Vivan', 'Hillory', 'Jadean',
'Amor', 'Dove', 'Khamoni', 'Undrea', 'Ronne', 'Canan', 'Lesile', 'Arri', 'Azell', 'Ramelle', 'Portland', 'Taron', 'Tahsin', 'Ronnie',
'Sameen', 'Nickita', 'Ronnelle', 'Malin', 'Morley', 'Tyan', 'Azariah', 'Rudie', 'Gursimran', 'Daune', 'Kenyata', 'Avo', 'Clarion',
'Fiyinfoluwa', 'Mckenzie', 'Naje', 'Courtney', 'Othel', 'Loghan', 'Jandell', 'Talor', 'Tash', 'Kamoni', 'Tawan', 'Lorin', 'Kary',
'Aareon', 'Subin', 'Rielly', 'Leny', 'Abiyah', 'Shai', 'Temiloluwa', 'Armistice', 'Marion', 'Mikey', 'Shalin', 'Jaye', 'Shiva', 'Lue',
'Joo', 'Erza', 'Larren', 'Annas', 'Jaimison', 'Everal', 'Binnie', 'Shondell', 'Josey', 'Pennington', 'Hiromi', 'Rai', 'Lolo', 'Fayne',
'Kaye', 'Naphtali', 'Kaoru', 'Rudi', 'Raynel', 'Averey', 'Jin', 'Keimari', 'Barber', 'Adgie', 'Bona', 'Arlice', 'Frankey', 'Carlis',
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'Linn', 'Chappell', 'Donel', 'Lannis', 'Diamon', 'Shanen', 'Marlow', 'Reyhan', 'Payson', 'Tavi', 'Yuuki', 'Shon', 'Luby', 'Tommye',
'Olamide', 'Laurien', 'Michel', 'Tristyn', 'Aurion', 'Esper', 'Matteson', 'Elan', 'Hong', 'Payton', 'Denim', 'Aner', 'Imar', 'Loris',
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'Bunnie', 'Moon', 'Mardy', 'Marris', 'Aideen', 'Zollie', 'Wynell', 'Ryver', 'Carlen', 'Cobie', 'Yuri', 'Jasdeep', 'Camerin', 'Glennie',
'Frenchie', 'Bell', 'Olly', 'Gabreil', 'Costello', 'Ritchie', 'Tylyn', 'Antonie', 'Zan', 'Jean', 'Lanier', 'Glendell', 'Tam', 'Kris',
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'Java', 'Judea', 'Jaqua', 'Kennedy', 'Huntyr', 'Ayan', 'Le', 'Graesyn', 'Ainsley', 'Terral', 'Alvern', 'Tyne', 'Augie', 'Sheon', 'Robbin',
'Darcell', 'Claiborne', 'Mang', 'Frankye', 'Burlie', 'Regan', 'Khori', 'Harjas', 'Jo', 'Rayli', 'Elver', 'Jadian', 'Kao', 'Jaris',
'Aundra', 'Lerin', 'Luddie', 'Honour', 'Ashtan', 'Acey', 'Tanaka', 'Camyron', 'Ferrol', 'Luegene', 'Huntlee', 'Shiron', 'Clio', 'Iran',
'Sabri', 'Janeil', 'Dorie', 'Shammah', 'Emer', 'Iyari', 'Shenandoah', 'Charlis', 'Keylen', 'Kenyada', 'Nature', 'Warnell', 'Brynnen',
'Johnni', 'Johne', 'Corie', 'Ayodele', 'Remmy', 'Innis', 'Bren', 'Evian', 'Veo', 'Eisa', 'Emmery', 'Jinan', 'Aimen', 'Tharon', 'Fernell',
'Michal', 'Arless', 'Anik', 'Shaquel', 'Rayn', 'Abey', 'Jeryl', 'Richie', 'Tane', 'Xzavia', 'Jontay', 'Brogan', 'Samar', 'Orel',
'Florenz', 'Oria', 'Brantlee', 'Kalae', 'Marlo', 'Taler', 'Espyn', 'Tovia', 'Shalon', 'Renner', 'Makayden', 'Sammie', 'Romey', 'Ivry',
'Larin', 'Scotti', 'Domenik', 'Jullian', 'Lenzy', 'Ugonna', 'Monta', 'Santonia', 'Lamoyne', 'Onyx', 'Dory', 'Sage', 'Delore', 'Donne',
'Shevy', 'Nevada', 'Ye', 'Tayde', 'Jonnah', 'Mancy', 'Lan', 'Tyjae', 'Karson', 'Omega', 'Lynden', 'Jaedin', 'Aster', 'Hiawatha',
'Vershawn', 'Mearl', 'Ossie', 'Sascha', 'Jaylien', 'Abriel', 'Paycen', 'Renne', 'Alder', 'Kellis', 'Elis', 'Laakea', 'Noell', 'Carlie',
'Oreoluwa', 'Juna', 'Guadalupe', 'Karroll', 'Aeron', 'Tary', 'Rily', 'Barri', 'Khristian', 'Freddi', 'Ramee', 'Erioluwa', 'Yee', 'Vishva',
'Akon', 'Rayel', 'Amen', 'Iver', 'Lavere', 'Kaisyn', 'Jaxyn', 'Macon', 'Ezariah', 'Latrelle', 'Raylen', 'Caisyn', 'Darnel', 'Devery',
'Hudsyn', 'Trayce', 'Grae', 'Olee', 'Zonnie', 'Clydell', 'Kay', 'Cyncere', 'Doll', 'Raeshawn', 'Llewellyn', 'Rahja', 'Atley', 'Ju',
'True', 'Sherrel', 'Cotie', 'Wilmeth', 'Mattia', 'Jacobia', 'Graysen', 'Caton', 'Theory', 'Roshawn', 'Nassim', 'Allah', 'Jardin',
'Deontra', 'Fathi', 'Acy', 'Alva', 'Laquan', 'Dyan', 'Posey', 'Chandlar', 'Joriah', 'Laquay', 'Caelan', 'Monroe', 'Jonie', 'Arlet',
'Jasman', 'Rhian', 'Simran', 'Mursal', 'Sae', 'Lowe', 'Wardie', 'Haidyn', 'Adonai', 'Ynes', 'Eldrid', 'Jorah', 'Teryl', 'Rmani',
'Sukhman', 'Pacey', 'Storme', 'Saber', 'Krishna', 'Emel', 'Cadyn', 'Jaqui', 'Trevis', 'Haiden', 'Aleksis', 'Ofir', 'Qamar', 'Marqui',
'Corley', 'Dung', 'Evyn', 'Aavyn', 'Joda', 'Masyn', 'Denym', 'Demea', 'Bandy', 'Zhi', 'Drue', 'Mesiyah', 'Aquarius', 'Katrell', 'Bleu',
'Chiron', 'Yuval', 'Demetrise', 'Terin', 'Kamyron', 'Mica', 'Videl', 'Ragene', 'Torrance', 'Jourdan', 'Reecie', 'Kei', 'Jalani', 'Tuong',
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'Desire', 'Trinell', 'Esli', 'Bentura', 'Bliss', 'Alie', 'Micale', 'Malakia', 'Osie', 'Otie', 'Haydyn', 'Kace', 'La', 'Nasim', 'Liberty',
'Jaidin', 'Daniell', 'Criss', 'Gayle', 'Jaspreet', 'Emo', 'Jireh', 'Elize', 'Rowan', 'Oluwajomiloju', 'Carnie', 'Kersey', 'Baylin',
'Rockie', 'Gabby', 'Sarin', 'Jaydee', 'Merced', 'Connelly', 'Delone', 'Starlin', 'Loverne', 'Marshon', 'Toryn', 'Asuncion', 'Janiel',
'Ming', 'Seeley', 'Okie', 'Ekin', 'Jojo', 'Tory', 'Trust', 'Wing', 'Heathe', 'Clellie', 'Vel', 'Kemori', 'Arvie', 'Kelin', 'Tone', 'Yael',
'Nguyen', 'Dace', 'Jissie', 'Rayne', 'Plumer', 'Konnar', 'Unkown', 'Altie', 'Zacari', 'Andrell', 'Gabriell', 'Jersey', 'Yun', 'Mahin',
'Aarya', 'Terraine', 'Shann', 'Troi', 'Gustie', 'Terrice', 'Vennie', 'Mattingly', 'Varian', 'Cortney', 'Nollie', 'Tylar', 'Joss', 'Ja',
'Zai', 'Harlin', 'Aleksi', 'Tres', 'Shermaine', 'Eren', 'Huxlee', 'Paxton', 'Baxley', 'Uriyah', 'Sheron', 'Myrlin', 'Rael', 'Delaney',
'Nekoda', 'Tayne', 'Arcie', 'Criston', 'Asriel', 'Terril', 'Corian', 'Jahel', 'Allyn', 'Kiyomi', 'Toi', 'Laquarius', 'Markie', 'Ashten',
'Dorn', 'Braidyn', 'Marki', 'Donis', 'Musiq', 'Jasi', 'Nikola', 'Rieley', 'Miccah', 'Bar', 'Kilyn', 'Luverne', 'Jaidence', 'Keymani',
'Savoy', 'Rollins', 'Cheney', 'Ermie', 'Toshi', 'Eddi', 'Mcrae', 'Lonni', 'Delacy', 'Domnique', 'Maywood', 'Nickola', 'Amryn', 'Wen',
'Skyland', 'Linell', 'Unice', 'Eisley', 'Jamary', 'Cordelle', 'Edwidge', 'Joell', 'Ai', 'Kamaron', 'Arin', 'Laredo', 'Mandeep',
'Giavonni', 'Kellyn', 'Arlow', 'Omani', 'Shanan', 'Arys', 'Fredi', 'Onell', 'Korby', 'Quinta', 'Aryan', 'Demetrias', 'Dorean', 'Avion',
'Zamarie', 'Augustine', 'Irish', 'Sopheap', 'Ji', 'Meco', 'Collynn', 'Jaydin', 'Semajae', 'Ova', 'Tazmin', 'Korin', 'Infantof', 'Landry',
'Manjot', 'Tsering', 'Shelley', 'Eldie', 'Wilkie', 'Man', 'Dione', 'Mikale', 'Kieryn', 'Laine', 'Truly', 'Jacy', 'Alvine', 'Aime', 'Avon',
'Tho', 'Breez', 'Cheyenne', 'Musa', 'Patsy', 'Jhonnie', 'Loice', 'Brekyn', 'Maclaren', 'Gudalupe', 'Shonnon', 'Terre', 'Harlo', 'Lurie',
'Ran', 'Arnez', 'Sokha', 'Camrin', 'Kosisochukwu', 'Sagan', 'Deshannon', 'Davionne', 'Tupou', 'Darcy', 'Carlon', 'Magic', 'Namari',
'Charron', 'Hardeep', 'Lannie', 'Juno', 'Blakely', 'Lanis', 'Tijay', 'Shaton', 'Aquila', 'Temple', 'Marcell', 'Vallee', 'Tomie', 'Elba',
'Reili', 'Izel', 'Trystyn', 'Armahni', 'Nickie', 'Cordy', 'Cloudie', 'Nijae', 'Lonell', 'Oluwatoni', 'Fair', 'Disney', 'Henly', 'Rodie',
'Rasheen', 'Vanness', 'Yona', 'Lemmie', 'Alfa', 'Vero', 'Shakti', 'Narin', 'Altonia', 'Kenyae', 'Jailan', 'Laney', 'Aley', 'Rameen',
'Sherley', 'Ogechukwu', 'Ren', 'Sothea', 'Claudy', 'Rio', 'Martell', 'Ebby', 'Kensly', 'Zahari', 'Jamani', 'Alaa', 'Lennyn', 'Ruble',
'Azion', 'Mykal', 'Bryne', 'Jimmie', 'Lavoris', 'Aree', 'Trystin', 'Pat', 'Murrel', 'Jadan', 'Orean', 'Shan', 'Stephane', 'Aaren',
'Odell', 'Erike', 'Jet', 'Odean', 'Unknown', 'Vee', 'Demery', 'Angelus', 'Dene', 'Rafa', 'Angel', 'Kenyatta', 'Yardley', 'Danieal',
'Keagan', 'Keyshawn', 'Jewel', 'Blythe', 'Azayah', 'Jae', 'Zyaire', 'Rahat', 'Bryn', 'An', 'Damilola', 'Lorrie', 'Autry', 'Safi',

'Garnet', 'Autie', 'Orbie', 'Merrell', 'Lyan', 'Oluwaseun', 'Schell', 'Emery', 'Jimi', 'Kiernan', 'Uganda', 'Donelle', 'Saxon',
'Glendale', 'Temani', 'Tamaris', 'Arkie', 'Areyon', 'Jodeci', 'Andri', 'Grasyn', 'Verlyn', 'Torino', 'Jahaan', 'Normal', 'Rumi', 'Sugar',
'Aryon', 'Rosemond', 'Berkeley', 'Bertie', 'Ryn', 'Tsion', 'Ashtin', 'Schylar', 'Janas', 'Toluwanimi', 'Terrace', 'Oshen', 'Jazzman',
'Merriel', 'Dustine', 'Franki', 'Callan', 'Izzy', 'Declyn', 'Jeel', 'Chrishawn', 'Matti', 'Udell', 'Adisa', 'Jie', 'Audy', 'Keilin',
'Jamarea', 'Asanti', 'Georgio', 'Brylin', 'Danon', 'Niger', 'Eldra', 'Mayan', 'Osiris', 'Olis', 'Shavaughn', 'Chesleigh', 'Jamisen',
'Sakae', 'Dennie', 'Avriel', 'Karey', 'Shondel', 'Kehinde', 'Frankie', 'Mikie', 'Raedyn', 'Karn', 'Pita', 'Aivan', 'Bralyn', 'Braylenn',
'Macy', 'Kayton', 'Wildred', 'Shea', 'Shayde', 'Merril', 'Tyrese', 'Catlin', 'Hady', 'Laylen', 'Chancey', 'Caylen', 'Alexi', 'Robin',
'Sylver', 'Embry', 'Audre', 'Callaway', 'Athel', 'Sloan', 'Hanley', 'Neyamiah', 'Shi', 'Ripley', 'Jolly', 'Algia', 'Tashawn', 'Vy',
'Damarie', 'Ashai', 'Burkley', 'Marvelous', 'Maui', 'Cha', 'Chancy', 'Nehal', 'Brin', 'Shemaiah', 'Ozzie', 'Linnie', 'Ryelin', 'Laquinn',
'Murtha', 'Verlen', 'Raja', 'Tashi', 'Ludie', 'Tauren', 'Rashea', 'Willoughby', 'Marchella', 'Hadyn', 'Davae', 'Ashton', 'Tammy', 'Vail',
'Wandell', 'Elgene', 'Keita', 'Noris', 'Eris', 'Tinker', 'Cantrell', 'Edis', 'Mitchelle', 'Shoney', 'Chaise', 'Alika', 'Perseus',
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'Jadie', 'Tonnie', 'Adraine', 'Dietrich', 'Renny', 'Jessy', 'Fortune', 'Abyan', 'Jasmir', 'Vale', 'Brand', 'Dorcie', 'Zaryn', 'Arlie',
'Genie', 'Deejay', 'Yury', 'Breland', 'Refugio', 'Baley', 'Aiman', 'Dodi', 'Davine', 'Dester', 'Loran', 'Irby', 'Arnel', 'Aubra',
'Shelby', 'Heli', 'Pet', 'Corby', 'Hilery', 'Kemoni', 'Keary', 'Kyley', 'Christie', 'Jasyiah', 'Naseem', 'Bowie', 'Zannie', 'Gal',
'Boluwatife', 'Jeylani', 'Khali', 'Coley', 'Rozelle', 'Emanuelle', 'Hillary', 'Jackie', 'Mylan', 'Jovonne', 'Hananiah', 'Yu', 'Dylann',
'Vashon', 'Emjay', 'Lory', 'Ryen', 'Smith', 'Shemari', 'July', 'Rease', 'Jayce', 'Harlym', 'Amey', 'Terah', 'Skylan', 'Reign', 'Ohara',
'Shirl', 'Hemi', 'Claren', 'Ashante', 'Levarn', 'Merdith', 'Maciah', 'Blakley', 'Karsin', 'Montez', 'Waverly', 'Riko', 'Trea', 'Jazz',
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'Laurice', 'Donyale', 'Greylin', 'Thoma', 'Dondra', 'Stellar', 'Lenell', 'Ilian', 'Zong', 'Eniola', 'Valin', 'Kayron', 'Yuriah', 'Shell',
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'Ayomide', 'Akili', 'Yoltzin', 'Alijha', 'Azure', 'Kendelle', 'Alexus', 'Hyatt', 'Artell', 'Owynn', 'Oluwaseyifunmi', 'Lawon', 'Valon',
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'Artice', 'Reilly', 'Kahmari', 'Cordell', 'Ahmari', 'Kyre', 'Christien', 'Keonte', 'Lakee', 'Chai', 'Coye', 'Keyan', 'Bristol', 'Rama',
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'Terriel', 'Kortney', 'Sachary', 'Kentley', 'Channy', 'Gael', 'Ngawang', 'Cailean', 'Laramie', 'Kaydyn', 'Jadis', 'Beebe', 'Georgy',
'Ireoluwa', 'Javon', 'Kashe', 'Navi', 'Lasalle', 'Tennessee', 'Dela', 'Mishawn', 'Nesta', 'Fiore', 'Jamie', 'Nellis', 'Dima', 'Shyler',
'Anesti', 'Silver', 'Taran', 'Rozay', 'Rondie', 'Gamble', 'Sutton', 'Jonatha', 'Son', 'Reagan', 'Navada', 'Deovion', 'Kamsiyochukwu',
'Destine', 'Crosby', 'Tailor', 'Shalom', 'Ollie', 'Jobie', 'Kahne', 'Elgie', 'Demetress', 'Zay', 'Dariel', 'Sher', 'Carron', 'Doni',
'Jamere', 'Dezi', 'Blayke', 'Liron', 'Dylyn', 'Asian', 'Constant', 'Nicoli', 'Raylan', 'Juelle', 'Dwan', 'Haize', 'Peyson', 'Mar', 'Amo',
'Cleao', 'Carrol', 'Raven', 'Delona', 'Theo', 'Shelly', 'Christen', 'Keni', 'Asencion', 'Tore', 'Nieves', 'Connell', 'Aubren', 'Nassiah',
'Montrice', 'Darcus', 'Scyler', 'Reese', 'Gen', 'Vernie', 'Mozell', 'Dezzie', 'Kharis', 'Tristen', 'Ori', 'Ande', 'Shawn', 'Gariel',
'Mckenly', 'Kashka', 'Novel', 'Selester', 'Raymell', 'Loxley', 'Kerby', 'Laurel', 'Nur', 'Carsen', 'Reiley', 'Cobi', 'Curley', 'Kamali',
'Bracy', 'Camile', 'Kylin', 'Ermel', 'Lovell', 'Ronit', 'Jeris', 'Aerion', 'Nikko', 'Taiwan', 'Larri', 'Khilyn', 'Deylin', 'Jovann',
'Ramie', 'Camara', 'Murle', 'Dois', 'Yinuo', 'Chantha', 'Hailey', 'Chesley', 'Gabrieal', 'Joany', 'Jaylein', 'Arguster', 'Toluwalase',
'Simmie', 'Juell', 'Delayne', 'Dashan', 'Sing', 'Rochon', 'Masada', 'Deshone', 'Jaidyn', 'Callaghan', 'Meril', 'Ammer',
'Branigan', 'Lundon', 'Lowry', 'Tannie', 'Gemini', 'Talma', 'Oma', 'Alfie', 'Danell', 'Tarron', 'Arshdeep', 'Leonides', 'Lyndan',
'Hensley', 'Bradlie', 'Divine', 'Jeffie', 'Nikita', 'Blue', 'Billi', 'Peja', 'Kham', 'Tiante', 'Sylvesta', 'Adeola', 'Mykah', 'Rogue',
'Bivian', 'Arley', 'Tyger', 'Abrar', 'Jhordyn', 'Ovel', 'Kekeli', 'Shaquelle', 'Skyeler', 'Jorey', 'Corlis', 'Sehajpreet', 'Riyan',
'Mays', 'Ermon', 'Latrell', 'Jatori', 'Kaena', 'Teva', 'Andrean', 'Darrelle', 'Rassie', 'Tuyen', 'Shiya', 'Lashane', 'Mackenzy', 'Caylan',
'Samora', 'Wendelin', 'Devlyn', 'Marlen', 'Robi', 'Atari', 'Mylin', 'Nazaret', 'Manhattan', 'Mechel', 'Login', 'Mena', 'Edell', 'Han',
'Bela', 'Matia', 'Oluwapelumi', 'Soryn', 'Aires', 'Yixuan', 'Ody', 'Elisha', 'Kanan', 'Abishai', 'Jamille', 'Jung', 'Amarri', 'Trenell',
'Collyn', 'Lotanna', 'Sherald', 'Tayari', 'Trelynn', 'Maziah', 'Shaka', 'Romaine', 'Dobbie', 'Marchel', 'Mattison', 'Darragh', 'Kelsey',
'Beverley', 'Adrienn', 'Ondra', 'Doninique', 'Amadi', 'Syd', 'Revel', 'Jai', 'Raymie', 'Cleo', 'Kimoni', 'Jaleen', 'Marquel', 'Kenyota',
'Zohar', 'Chea', 'Kolbee', 'Ever', 'Thanh', 'Jacquel', 'Darby', 'Berthel', 'Shilo', 'Desi', 'Carliss', 'Ilya', 'Adrine', 'Chapel', 'Saia',
'Kenyari', 'Kameron', 'Terae', 'Irah', 'Rino', 'Brecken', 'Manpreet', 'Imri', 'Virdell', 'Zaire', 'Irin', 'Brylyn', 'Tarry', 'Sayge',
'Dharma', 'Temitayo', 'Phynix', 'Deundra', 'Peregrine', 'Kelcie', 'Augusta', 'Jaimey', 'Kristan', 'Reven', 'Jury', 'Mallory', 'Mieko',
'Orell', 'Mian', 'Maitland', 'Espn', 'Say', 'Garrie', 'Ronnye', 'Sukhjit', 'Kamron', 'Karem', 'Kaidyn', 'Danila', 'Justi', 'Ariann',
'Adama', 'Mega', 'Mikell', 'Katsumi', 'Dalynn', 'Jamyri', 'Emory', 'Loys', 'Kim', 'Shirrel', 'Kahlee', 'Shailen', 'Koy', 'Jimmi', 'Rmoni',
'Lovette', 'Rhen', 'Audie', 'Vernel', 'Fonta', 'Astyn', 'Joy', 'Ether', 'Sha', 'Tahjai', 'Aloise', 'Javoni', 'Jabri', 'Shavon', 'Shia',
'Krosby', 'Nakai', 'Abell', 'Jahzel', 'Mirage', 'Santrell', 'Shawnn', 'Orlee', 'Alexis', 'Cheyene', 'Greeley', 'Mikah', 'Brandyn',
'Teagon', 'Clair', 'Finesse', 'Oral', 'Giang', 'Dangel', 'Tarran', 'Xyon', 'El', 'Shadyn', 'Seng', 'Joyden', 'Kely', 'Daylin', 'Geryl',
'Ogie', 'Munachimso', 'Sherl', 'Deaven', 'Sitha', 'Cay', 'Massie', 'Quetzal', 'England', 'Deavon', 'Roen', 'Haydin', 'Jaelin', 'Uchenna',
'Lacie', 'Wilsie', 'Tracey', 'Neri', 'Azriah', 'Rynn', 'Romell', 'Tremaine', 'Kindred', 'Linden', 'Cagney', 'Najai', 'Shey', 'Taje',
'Free', 'Domique', 'Zacharee', 'Arsha', 'Femi', 'Ladon', 'Nation', 'Sheen', 'Kyante', 'Ladell', 'Neema', 'Meddie', 'Burnie', 'Sonnie',
'Cypress', 'Pasha', 'Toluwani', 'Cimarron', 'Zell', 'Lemon', 'Isa', 'Doye', 'Des', 'Camauri', 'Kemari', 'Paige', 'Bevin', 'Montea',
'Laverne', 'Domenique', 'Dakkota', 'Yoshi', 'Terez', 'Kijana', 'Caylor', 'Aubry', 'Birdell', 'Jette', 'Sharron', 'Zy', 'Gaylen', 'Baraka',

```
'Onyekachi', 'Verdel', 'Roddie', 'Terrian', 'Chaney', 'Fela', 'Monte', 'Armari', 'Taytem', 'Quay', 'Salam', 'Mischa', 'Arren', 'Maurya',
'Tellie', 'Lavaughn', 'Riley', 'Raydean', 'Jourden', 'Mckinnley', 'Rhyley', 'Brenin', 'Adis', 'Mabrey', 'Markelle', 'Demetric', 'Kamari',
'Caley', 'Kenyell', 'Averil', 'Sophana', 'Neshawn', 'Lafrance', 'Cameren', 'Christia', 'Enis', 'Sukhpreet', 'Argyle', 'Aeon', 'Hawley',
'Shone', 'Jahdai', 'Elisah', 'Damari', 'Chaquan', 'Danari', 'Shaheen', 'Ku', 'Karry', 'Deavion', 'Acelin', 'Nuri', 'Dorin', 'Graison',
'Bentlie', 'Terran', 'Daryan', 'Johnel', 'Admire'}
```

Problem 4:

After making an account we ran the following code in accordance with the data -preprocessing steps:

```python
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib

import matplotlib.pyplot as plt
import sklearn
from scipy.stats import skew
from scipy.stats import pearsonr

train = pd.read_csv("train.csv")
test = pd.read_csv("test.csv")
train.head()

all_data = pd.concat((train.loc[:,'MSSubClass':'SaleCondition'],
                      test.loc[:,'MSSubClass':'SaleCondition']))
#log transform the target:
train["SalePrice"] = np.log1p(train["SalePrice"])

#log transform skewed numeric features:
numeric_feats = all_data.dtypes[all_data.dtypes != "object"].index

skewed_feats = train[numeric_feats].apply(lambda x: skew(x.dropna())) #compute skewness
skewed_feats = skewed_feats[skewed_feats > 0.75]
skewed_feats = skewed_feats.index

all_data[skewed_feats] = np.log1p(all_data[skewed_feats])
all_data = pd.get_dummies(all_data)

#filling NA's with the mean of the column:
all_data = all_data.fillna(all_data.mean())
#creating matrices for sklearn:
X_train = all_data[:train.shape[0]]
X_test = all_data[train.shape[0]:]
y = train.SalePrice
```

After this we were ready to run different regression techniques .

We ran the following code to get a ridge regression using alpha = .1.

```python
from sklearn.linear_model import Ridge, RidgeCV, ElasticNet, LassoCV, LassoLarsCV, Lasso
from sklearn.model_selection import cross_val_score

ridge_model = RidgeCV(alphas = [.1]).fit(X_train, y)
ridge_predictions = np.expm1(ridge_model.predict(X_test))
results_part2 = pd.DataFrame({'Id' : test['Id'], 'SalePrice' : ridge_predictions})
```
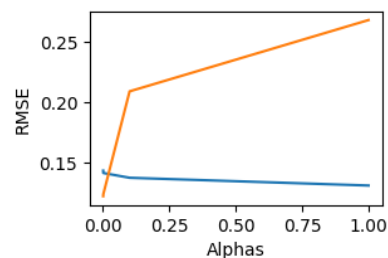
And created a submission for kaggle, which scored it as 0.13565.

For part 3, we compared root mean squared error for lasso and ridge regressions using different alphas:

```python
alphas = [.1,.2,.3,.4,.5,.6,.7,.8, 1,2,3,4,5,6,7,8,9,10,20,30,50]
cv_ridge = [rmse_cv(Ridge(alpha = alpha)).mean()
            for alpha in alphas]
cv_lasso = [rmse_cv(Lasso(alpha = alpha)).mean()
            for alpha in alphas]
```

```python
plt.plot(alphas,cv_ridge)
plt.plot(alphas, cv_lasso)
plt.xlabel("Alphas")
plt.ylabel("RMSE")
plt.rcParams['figure.figsize'] = [3, 2]
plt.show()
```


Using the same alpha values, and cross validation, we see that the ridge model is better for non-small alphas, while very small alphas favor the Lasso. Furthermore, the Lasso is much more sensitive to increasing alpha.

The best score we got from a single ridge was .1298.
The best score we got from a single lasso was .1234.

For part 4 we computed the l0 norm count with different Lasso distributions:
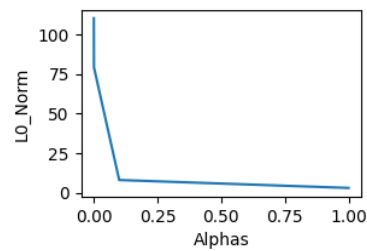
```python
l0_norm_counts = []
```

```
alphas = [1, 0.1, 0.001, 0.0005]
alphas.sort()
for alpha in alphas:
    model_lasso = LassoCV(alphas = [alpha]).fit(X_train, y)
    count = 0
    # For each beta prediction made by the lasso model
    for coef in model_lasso.coef_:
        #if non zero add
        if coef != 0:
            count += 1
    l0_norm_counts.append(count)
```

```
plt.plot(alphas, l0_norm_counts)
plt.xlabel("Alphas")
plt.ylabel("L0_Norm")
plt.rcParams['figure.figsize'] = [3, 2]
plt.show()
```


We ascertain that as regularization increases, more predictive coeffs are set to zero..

For part 5, we added the outputs of a Ridge and Lasso model as features and ran Ridge regression on that.

```
lasso_alpha = .005
ridge_alpha = 10

ridge_model = RidgeCV(alphas = [ridge_alpha]).fit(X_train, y)
lasso_model = LassoCV(alphas = [lasso_alpha]).fit(X_train, y)

ridge_preds = np.expm1(ridge_model.predict(X_test))
lasso_preds = np.expm1(lasso_model.predict(X_test))
X_test.insert(0,"Ridge Predicitons", pd.Series(ridge_preds))
X_test.insert(0,"Lasso Predicitons", pd.Series(lasso_preds))
X_train.insert(0,"Ridge Predicitons", pd.Series(ridge_preds))
X_train.insert(0,"Lasso Predicitons", pd.Series(lasso_preds))
X_train = X_train.fillna(X_train.mean())
X_test = X_test.fillna(X_test.mean())

X_train.head()
```

	Lasso Predicitons	Ridge Predicitons	MSSubClass	LotFrontage	LotArea	OverallQual	OverallCond	YearBuilt	YearRemodAdd	MasVnrArea	...	SaleType_Co
0	134834.271381	119029.138979	4.110874	4.189655	9.042040	7	5	2003	2003	5.283204	...	
1	151426.563288	153034.779102	3.044522	4.394449	9.169623	6	8	1976	1976	0.000000	...	
2	177531.501697	181011.214225	4.110874	4.234107	9.328212	7	5	2001	2002	5.093750	...	
3	205698.593280	197891.150510	4.262680	4.110874	9.164401	7	5	1915	1970	0.000000	...	
4	199775.104278	200308.084966	4.110874	4.442651	9.565284	8	5	2000	2000	5.860786	...	

5 rows × 290 columns

```
ridge_stack_model = RidgeCV(alphas = [10]).fit(X_train, y)
rsm_preds = ridge_stack_model.predict(X_test)
rsm_df = pd.DataFrame({"Id" : test["Id"] , "SalePrice" : np.expm1(rsm_preds)})
```

We created a csv file and got a Kaggle score of 0.12487.

For the final part of the lab we used xgboost to compute predictions.

```
import xgboost as xgb
model_xgb = xgb.XGBRegressor(n_estimators=360, max_depth=2, learning_rate=0.1)
xgb_preds = np.expm1(model_xgb.predict(X_test))
xgb_df = pd.DataFrame({"Id" : test["Id"] , "SalePrice" : xgb_preds})
```

Once again creating a csv file, and got a Kaggle score of 0.13278.