Andrew Hoang and Stanley Nguyen: Final Project

For this final project, we decided to use the flight arrival dataset. This dataset contains multiple airlines and airports with information about their plane's arrivals, delays, cancellations, etc from 2019. This data only represents a portion of all flights and airports in the US. We decided to use this dataset due to its uniqueness and help answer the question of "Which airline is best?". To answer this question, we looked at four categories in the dataset: the on time arrivals, cancelled flights, delayed flights, and late planes. We felt that these four criteria can help determine which airline is the most consistent and reliable.

Summer is approaching rapidly and that means family vacations. Many families will travel to places like Florida and California in order to have a fun time with their friends and family. In order to do this though, many families have to book flights in advanced and that can be a rather stressful process. From deciding when to take the flight, which airline to take it from, how many seats you need, planning a family trip can be quite stressful and taxing. Through this project, we hope that we can help with that stressful project by recommending certain airlines. Although this seems rather miniscule in the whole process, once you choose a certain airline, you only have to choose the date of the flight and how many seats needed. There would be no need to jump around to a multitude of different airlines. This project will analyze and determine which airlines are the most reliable for people to take so that they can have an enjoyable vacation.

```
flights = table2struct(readtable('Final.xlsx', 'PreserveVariableNames', true));
```

Code:

For the coding portion, we first imported the excel workbook into Matlab so we can utilize the tools and coding functions to help determine the best airline. We sectioned off each of the airlines into their own structs (they were all in order in the excel file), so we could easily maneuver between different airlines. After making structs of all the airlines, we created arrays for the categories we listed above (on time arrivals, cancellations, delays, and late planes), took the sum of each array, and then summed everything to create a number which represented all the flights of a specific airline. We did this in order to be able to obtain percentages for each category which would make it easier to determine the best airline. By taking the total of each category and dividing it by the total amount of flights of the whole airline, we were able to determine the percentage of flights of each category. This process was done for all 17 airlines.

When discussing how the program should be made, we first had ideas of just comparing the mins and maxes of each category. However, we quickly realized that wouldn't make sense as many airports have differing amount of flights each day/year. We then moved on to the percentage idea. To make it fair for all airlines, we decided to take the total sum of all the categories and divide by the respective category in order to get the percentage. This would make it fair as this method did not make the percentages rely on the size of the airports or any other factors. Instead, it was just based on the flights that were documented.

```
envoy_air = [flights(1:20)];
envoy_air_flight_arrivals = [envoy_air(:).arr_flights];
envoy_air_cancelled_arrivals = [envoy_air(:).arr_cancelled];
envoy_air_carrier_delays = [envoy_air(:).carrier_delay];
envoy_air_late_aircrafts = [envoy_air(:).late_aircraft_delay];

sum_envoy_air_arrivals = sum(envoy_air_flight_arrivals);
sum_envoy_air_cancelled = sum(envoy_air_cancelled_arrivals);
```

```
sum_envoy_air_delay = sum(envoy_air_carrier_delays);
sum_envoy_air_late = sum(envoy_air_late_aircrafts);

sum_total_envoy = sum_envoy_air_late+sum_envoy_air_cancelled+sum_envoy_air_delay+sum_envoy_air_
envoy_arrival = sum_envoy_air_arrivals/sum_total_envoy;
envoy_cancelled = sum_envoy_air_cancelled/sum_total_envoy;
envoy_delay = sum_envoy_air_delay/sum_total_envoy;
envoy_late = sum_envoy_air_late/sum_total_envoy;

spirit_air_lines = [flights(21:63)];
spirit_air_lines_flight_arrivals = [spirit_air_lines(:).arr_flights];
spirit_air_lines_cancelled_arrivals = [spirit_air_lines(:).arr_cancelled];
spirit_air_lines_carrier_delays = [spirit_air_lines(:).carrier_delay];
spirit_air_lines_late_aircrafts = [spirit_air_lines(:).late_aircraft_delay];

sum_spirit_arrivals = sum(spirit_air_lines_flight_arrivals);
sum_spirit_cancelled = sum(spirit_air_lines_cancelled_arrivals);
sum_spirit_delay = sum(spirit_air_lines_carrier_delays);
sum_spirit_late = sum(spirit_air_lines_late_aircrafts);

sum_total_spirit = sum_spirit_arrivals+sum_spirit_cancelled+sum_spirit_delay+sum_spirit_late;
spirit_arrival = sum_spirit_arrivals/sum_total_spirit;
spirit_cancelled = sum_spirit_cancelled/sum_total_spirit;
spirit_delay = sum_spirit_delay/sum_total_spirit;
spirit_late = sum_spirit_late/sum_total_spirit;

psa_airlines = [flights(64:158)];
psa_airlines_flight_arrivals = [psa_airlines(:).arr_flights];
psa_airlines_cancelled_arrivals = [psa_airlines(:).arr_cancelled];
psa_airlines_carrier_delays = [psa_airlines(:).carrier_delay];
psa_airlines_late_aircrafts = [psa_airlines(:).late_aircraft_delay];

sum_psa_arrivals = sum(psa_airlines_flight_arrivals);
sum_psa_cancelled = sum(psa_airlines_cancelled_arrivals);
sum_psa_delay = sum(psa_airlines_carrier_delays);
sum_psa_late = sum(psa_airlines_late_aircrafts);

sum_total_psa = sum_psa_arrivals+sum_psa_cancelled+sum_psa_delay+sum_psa_late;
psa_arrival = sum_psa_arrivals/sum_total_psa;
psa_cancelled = sum_psa_cancelled/sum_total_psa;
psa_delay = sum_psa_delay/sum_total_psa;
psa_late = sum_psa_late/sum_total_psa;

skywest_airlines = [flights(159:398)];
skywest_airlines_flight_arrivals = [skywest_airlines(:).arr_flights];
skywest_airlines_flight_arrivals(23) = [];
skywest_airlines_cancelled_arrivals = [skywest_airlines(:).arr_cancelled];
skywest_airlines_cancelled_arrivals(23) = [];
skywest_airlines_carrier_delays = [skywest_airlines(:).carrier_delay];
skywest_airlines_carrier_delays(23) = [];
skywest_airlines_late_aircrafts = [skywest_airlines(:).late_aircraft_delay];
skywest_airlines_late_aircrafts(23) = [];

sum_skywest_arrivals = sum(skywest_airlines_flight_arrivals);
```

```
sum_skywest_cancelled = sum(skywest_airlines_cancelled_arrivals);
sum_skywest_delay = sum(skywest_airlines_carrier_delays);
sum_skywest_late = sum(skywest_airlines_late_aircrafts);

sum_total_skywest = sum_skywest_arrivals+sum_skywest_cancelled+sum_skywest_delay+sum_skywest_la
skywest_arrival = sum_skywest_arrivals/sum_total_skywest;
skywest_cancelled = sum_skywest_cancelled/sum_total_skywest;
skywest_delay = sum_skywest_delay/sum_total_skywest;
skywest_late = sum_skywest_late/sum_total_skywest;

united_air_lines = [flights(399:506)];
united_air_lines_flight_arrivals = [united_air_lines(:).arr_flights];
united_air_lines_flight_arrivals(66) =[];
united_air_lines_cancelled_arrivals = [united_air_lines(:).arr_cancelled];
united_air_lines_cancelled_arrivals(66) =[];
united_air_lines_carrier_delays = [united_air_lines(:).carrier_delay];
united_air_lines_carrier_delays(66) =[];
united_air_lines_late_aircrafts = [united_air_lines(:).late_aircraft_delay];
united_air_lines_late_aircrafts(66) =[];

sum_united_arrivals = sum(united_air_lines_flight_arrivals);
sum_united_cancelled = sum(united_air_lines_cancelled_arrivals);
sum_united_delay = sum(united_air_lines_carrier_delays);
sum_united_late = sum(united_air_lines_late_aircrafts);

sum_total_united = sum_united_arrivals+sum_united_cancelled+sum_united_delay+sum_united_late;
united_arrival = sum_united_arrivals/sum_total_united;
united_cancelled = sum_united_cancelled/sum_total_united;
united_delay = sum_united_delay/sum_total_united;
united_late = sum_united_late/sum_total_united;

southwest_airlines = [flights(507:591)];
southwest_airlines_flight_arrivals = [southwest_airlines(:).arr_flights];
southwest_airlines_cancelled_arrivals = [southwest_airlines(:).arr_cancelled];
southwest_airlines_carrier_delays = [southwest_airlines(:).carrier_delay];
southwest_airlines_late_aircrafts = [southwest_airlines(:).late_aircraft_delay];

sum_southwest_arrivals = sum(southwest_airlines_flight_arrivals);
sum_southwest_cancelled = sum(southwest_airlines_cancelled_arrivals);
sum_southwest_delay = sum(southwest_airlines_carrier_delays);
sum_southwest_late = sum(southwest_airlines_late_aircrafts);

sum_total_southwest = sum_southwest_arrivals+sum_southwest_cancelled+sum_southwest_delay+sum_so
southwest_arrival = sum_southwest_arrivals/sum_total_southwest;
southwest_cancelled = sum_southwest_cancelled/sum_total_southwest;
southwest_delay = sum_southwest_delay/sum_total_southwest;
southwest_late = sum_southwest_late/sum_total_southwest;

mesa_airlines = [flights(592:694)];
mesa_airlines_flight_arrivals = [mesa_airlines(:).arr_flights];
mesa_airlines_flight_arrivals(60) = [];
mesa_airlines_cancelled_arrivals = [mesa_airlines(:).arr_cancelled];
mesa_airlines_cancelled_arrivals(60) = [];
mesa_airlines_carrier_delays = [mesa_airlines(:).carrier_delay];
```

```
mesa_airlines_carrier_delays(60) = [];
mesa_airlines_late_aircrafts = [mesa_airlines(:).late_aircraft_delay];
mesa_airlines_late_aircrafts(60) = [];

sum_mesa_arrivals = sum(mesa_airlines_flight_arrivals);
sum_mesa_cancelled = sum(mesa_airlines_cancelled_arrivals);
sum_mesa_delay = sum(mesa_airlines_carrier_delays);
sum_mesa_late = sum(mesa_airlines_late_aircrafts);

sum_total_mesa = sum_mesa_arrivals+sum_mesa_cancelled+sum_mesa_delay+sum_mesa_late;
mesa_arrival = sum_mesa_arrivals/sum_total_mesa;
mesa_cancelled = sum_mesa_cancelled/sum_total_mesa;
mesa_delay = sum_mesa_delay/sum_total_mesa;
mesa_late = sum_mesa_late/sum_total_mesa;

republic_airline = [flights(695:781)];
republic_airline_flight_arrivals = [republic_airline(:).arr_flights];
republic_airline_cancelled_arrivals = [republic_airline(:).arr_cancelled];
republic_airline_carrier_delays = [republic_airline(:).carrier_delay];
republic_airline_late_aircrafts = [republic_airline(:).late_aircraft_delay];

sum_republic_arrivals = sum(republic_airline_flight_arrivals);
sum_republic_cancelled = sum(republic_airline_cancelled_arrivals);
sum_republic_delay = sum(republic_airline_carrier_delays);
sum_republic_late = sum(republic_airline_late_aircrafts);

sum_total_republic = sum_republic_arrivals+sum_republic_cancelled+sum_republic_delay+sum_republ
republic_arrival = sum_republic_arrivals/sum_total_republic;
republic_cancelled = sum_republic_cancelled/sum_total_republic;
republic_delay = sum_republic_delay/sum_total_republic;
republic_late = sum_republic_late/sum_total_republic;

endeavor_air = [flights(782:876)];
endeavor_air_flight_arrivals = [endeavor_air(:).arr_flights];
endeavor_air_cancelled_arrivals = [endeavor_air(:).arr_cancelled];
endeavor_air_carrier_delays = [endeavor_air(:).carrier_delay];
endeavor_air_late_aircrafts = [endeavor_air(:).late_aircraft_delay];

sum_endeavor_arrivals = sum(endeavor_air_flight_arrivals);
sum_endeavor_cancelled = sum(endeavor_air_cancelled_arrivals);
sum_endeavor_delay = sum(endeavor_air_carrier_delays);
sum_endeavor_late = sum(endeavor_air_late_aircrafts);

sum_total_endeavor = sum_endeavor_arrivals+sum_endeavor_cancelled+sum_endeavor_delay+sum_endeav
endeavor_arrival = sum_endeavor_arrivals/sum_total_endeavor;
endeavor_cancelled = sum_endeavor_cancelled/sum_total_endeavor;
endeavor_delay = sum_endeavor_delay/sum_total_endeavor;
endeavor_late = sum_endeavor_late/sum_total_endeavor;

american_airlines = [flights(877:979)];
american_airlines_flight_arrivals = [american_airlines(:).arr_flights];
american_airlines_cancelled_arrivals = [american_airlines(:).arr_cancelled];
american_airlines_carrier_delays = [american_airlines(:).carrier_delay];
american_airlines_late_aircrafts = [american_airlines(:).late_aircraft_delay];
```

```
sum_american_arrivals = sum(american_airlines_flight_arrivals);
sum_american_cancelled = sum(american_airlines_cancelled_arrivals);
sum_american_delay = sum(american_airlines_carrier_delays);
sum_american_late = sum(american_airlines_late_aircrafts);

sum_total_american = sum_american_arrivals+sum_american_cancelled+sum_american_delay+sum_americ
american_arrival = sum_american_arrivals/sum_total_american;
american_cancelled = sum_american_cancelled/sum_total_american;
american_delay = sum_american_delay/sum_total_american;
american_late = sum_american_late/sum_total_american;

Hawaiian_airlines=[flights(1566:1583)];
HA_arr_flights=[Hawaiian_airlines(:).arr_flights];
HA_arr_cancelled=[Hawaiian_airlines(:).arr_cancelled];
HA_carrier_delay=[Hawaiian_airlines(:).carrier_delay];
HA_late_aircraft_delay=[Hawaiian_airlines(:).late_aircraft_delay];

sum_hawaiian_arrivals = sum(HA_arr_flights);
sum_hawaiian_cancelled = sum(HA_arr_cancelled);
sum_hawaiian_delay = sum(HA_carrier_delay);
sum_hawaiian_late = sum(HA_late_aircraft_delay);

sum_total_hawaiian = sum_hawaiian_arrivals+sum_hawaiian_cancelled+sum_hawaiian_delay+sum_hawaii
hawaiian_arrival = sum_hawaiian_arrivals/sum_total_hawaiian;
hawaiian_cancelled = sum_hawaiian_cancelled/sum_total_hawaiian;
hawaiian_delay = sum_hawaiian_delay/sum_total_hawaiian;
hawaiian_late = sum_hawaiian_late/sum_total_hawaiian;

Allegiant_Air=[flights(1446:1565)];
AA_arr_flights=[Allegiant_Air(:).arr_flights];
AA_arr_cancelled=[Allegiant_Air(:).arr_cancelled];
AA_carrier_delay=[Allegiant_Air(:).carrier_delay];
AA_late_aircraft_delay=[Allegiant_Air(:).late_aircraft_delay];

sum_allegiant_arrivals = sum(AA_arr_flights);
sum_allegiant_cancelled = sum(AA_arr_cancelled);
sum_allegiant_delay = sum(AA_carrier_delay);
sum_allegiant_late = sum(AA_late_aircraft_delay);

sum_total_allegiant = sum_allegiant_arrivals+sum_allegiant_cancelled+sum_allegiant_delay+sum_al
allegiant_arrival = sum_allegiant_arrivals/sum_total_allegiant;
allegiant_cancelled = sum_allegiant_cancelled/sum_total_allegiant;
allegiant_delay = sum_allegiant_delay/sum_total_allegiant;
allegiant_late = sum_allegiant_late/sum_total_allegiant;

Frontier_Airlines=[flights(1355:1445)];
FA_arr_flights=[Frontier_Airlines(:).arr_flights];
FA_arr_cancelled=[Frontier_Airlines(:).arr_cancelled];
FA_carrier_delay=[Frontier_Airlines(:).carrier_delay];
FA_late_aircraft_delay=[Frontier_Airlines(:).late_aircraft_delay];

sum_frontier_arrivals = sum(FA_arr_flights);
sum_frontier_cancelled = sum(FA_arr_cancelled);
```

```
sum_frontier_delay = sum(FA_carrier_delay);
sum_frontier_late = sum(FA_late_aircraft_delay);

sum_total_frontier = sum_frontier_arrivals+sum_frontier_cancelled+sum_frontier_delay+sum_fronti
frontier_arrival = sum_frontier_arrivals/sum_total_frontier;
frontier_cancelled = sum_frontier_cancelled/sum_total_frontier;
frontier_delay = sum_frontier_delay/sum_total_frontier;
frontier_late = sum_frontier_late/sum_total_frontier;

ExpressJet_Airlines_Inc=[flights(1255:1354)];
EAI_arr_flights=[ExpressJet_Airlines_Inc(:).arr_flights];
EAI_arr_cancelled=[ExpressJet_Airlines_Inc(:).arr_cancelled];
EAI_carrier_delay=[ExpressJet_Airlines_Inc(:).carrier_delay];
EAI_late_aircraft_delay=[ExpressJet_Airlines_Inc(:).late_aircraft_delay];

sum_expressjet_arrivals = sum(EAI_arr_flights);
sum_expressjet_cancelled = sum(EAI_arr_cancelled);
sum_expressjet_delay = sum(EAI_carrier_delay);
sum_expressjet_late = sum(EAI_late_aircraft_delay);

sum_total_expressjet = sum_expressjet_arrivals+sum_expressjet_cancelled+sum_expressjet_delay+su
expressjet_arrival = sum_expressjet_arrivals/sum_total_expressjet;
expressjet_cancelled = sum_expressjet_cancelled/sum_total_expressjet;
expressjet_delay = sum_expressjet_delay/sum_total_expressjet;
expressjet_late = sum_expressjet_late/sum_total_expressjet;

Delta_Air_Lines =[flights(1114:1254)];
DA_arr_flights=[Delta_Air_Lines(:).arr_flights];
DA_arr_cancelled=[Delta_Air_Lines(:).arr_cancelled];
DA_carrier_delay=[Delta_Air_Lines(:).carrier_delay];
DA_late_aircraft_delay=[Delta_Air_Lines(:).late_aircraft_delay];

sum_delta_arrivals = sum(DA_arr_flights);
sum_delta_cancelled = sum(DA_arr_cancelled);
sum_delta_delay = sum(DA_carrier_delay);
sum_delta_late = sum(DA_late_aircraft_delay);

sum_total_delta = sum_delta_arrivals+sum_delta_cancelled+sum_delta_delay+sum_delta_late;
delta_arrival = sum_delta_arrivals/sum_total_delta;
delta_cancelled = sum_delta_cancelled/sum_total_delta;
delta_delay = sum_delta_delay/sum_total_delta;
delta_late = sum_delta_late/sum_total_delta;

Jetblue =[flights(1050:1113)];
JB_arr_flights=[Jetblue(:).arr_flights];
JB_arr_cancelled=[Jetblue(:).arr_cancelled];
JB_carrier_delay=[Jetblue(:).carrier_delay];
JB_late_aircraft_delay=[Jetblue(:).late_aircraft_delay];

sum_jetblue_arrivals = sum(JB_arr_flights);
sum_jetblue_cancelled = sum(JB_arr_cancelled);
sum_jetblue_delay = sum(JB_carrier_delay);
sum_jetblue_late = sum(JB_late_aircraft_delay);
```

```
sum_total_jetblue = sum_jetblue_arrivals+sum_jetblue_cancelled+sum_jetblue_delay+sum_jetblue_la
jetblue_arrival = sum_jetblue_arrivals/sum_total_jetblue;
jetblue_cancelled = sum_jetblue_cancelled/sum_total_jetblue;
jetblue_delay = sum_jetblue_delay/sum_total_jetblue;
jetblue_late = sum_jetblue_late/sum_total_jetblue;

Alaska =[flights(980:1049)];
Alaska_arr_flights=[Alaska(:).arr_flights];
Alaska_arr_cancelled=[Alaska(:).arr_cancelled];
Alaska_carrier_delay=[Alaska(:).carrier_delay];
Alaska_late_aircraft_delay=[Alaska(:).late_aircraft_delay];

sum_alaska_arrivals = sum(Alaska_arr_flights);
sum_alaska_cancelled = sum(Alaska_arr_cancelled);
sum_alaska_delay = sum(Alaska_carrier_delay);
sum_alaska_late = sum(Alaska_late_aircraft_delay);

sum_total_alaska = sum_alaska_arrivals+sum_alaska_cancelled+sum_alaska_delay+sum_alaska_late;
alaska_arrival = sum_alaska_arrivals/sum_total_alaska;
alaska_cancelled = sum_alaska_cancelled/sum_total_alaska;
alaska_delay = sum_alaska_delay/sum_total_alaska;
alaska_late = sum_alaska_late/sum_total_alaska;
```

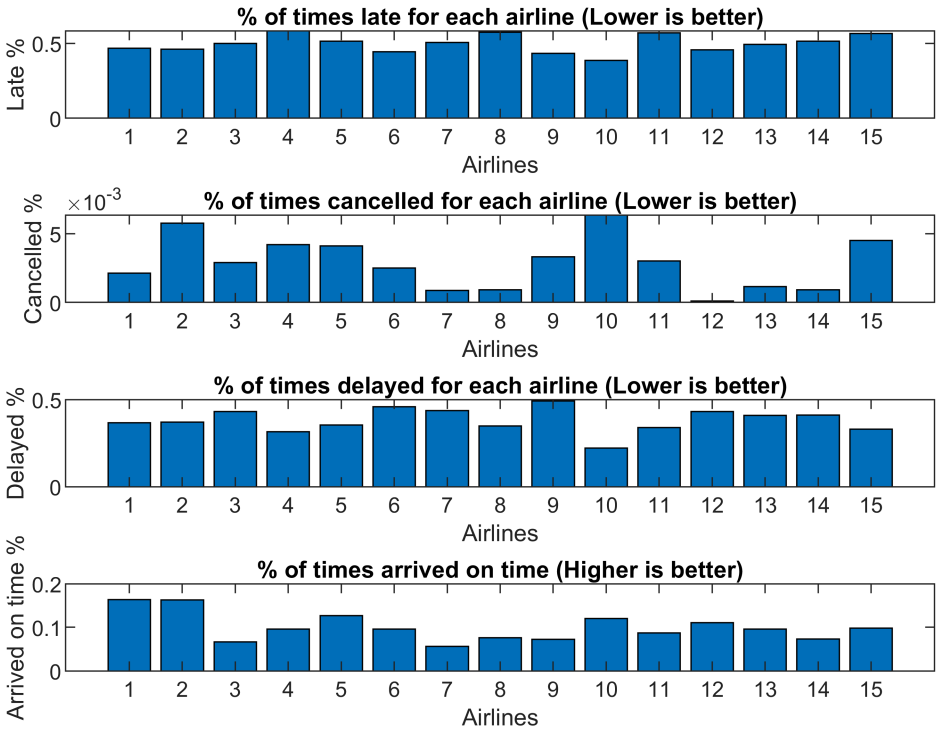
Visuals:

In order to help decipher and make the code above more digestable, we compiled the data into four graphs, each representing a certain category. This was done in the order of airlines in the above code. The visual is mainly used to help viewers clearly see the results of the code and the variance between airlines.

```
cancelled=[spirit_cancelled;southwest_cancelled;skywest_cancelled;republic_cancelled;psa_cancel

arrived=[spirit_arrival;southwest_arrival;skywest_arrival;republic_arrival;psa_arrival;mesa_arr

subplot(4,1,1)
bar(late)
xlabel('Airlines')
ylabel('Late %')
title('% of times late for each airline (Lower is better)')
subplot(4,1,2)
bar(cancelled)
xlabel('Airlines')
ylabel('Cancelled %')
title('% of times cancelled for each airline (Lower is better)')
subplot(4,1,3)
bar(delay)
xlabel('Airlines')
ylabel('Delayed %')
title('% of times delayed for each airline (Lower is better)')
subplot(4,1,4)
bar(arrived)
xlabel('Airlines')
ylabel('Arrived on time %')
title('% of times arrived on time (Higher is better)')
```



Printing:

After the program as complete, all that was left was to print the data. We decided to print the data for all the airlines which would then help us make a list of which airlines had the highest arrival, lowest cancellation, lowest delayed, and lowest late airplaines. From this data, we then decided from the four airlines which was the best by comparing each category. We decided to exempt Hawaiian Airlines as it had amazing numbers, but is only specific to Hawaii not the rest of the US. Finally, we were able to condense the data down to Envoy Air and Spirit Airlines being the best based off their percentages of on time flights, cancelled flights, delayed flights, and late planes. These two airlines ended up being the "recommended" airlines to take.

The data presented is very lengthy and wordy. We wanted to present it this way so the viewer can choose for themself what was the best. We did not want to definitely say that some airline was the best always and it had to be chosen. We wanted to just present data, and based off that data, have the viewer determine what was best for their current situation. Of course, we provided recommendations as some people are not willing to decipher all the data presented. Our main focus was to present the data in an organized way so that the viewer can easily see and understand everything, then based off that, determine what was best for them.

```
fprintf("In 2019, Alaska Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed,
```

```
In 2019, Alaska Airline flights were 9.80% on time, 0.45% cancelled, 33.08% delayed, and 56.67% late.
```

```
fprintf("In 2019, Allegiant Air flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed,
```

```
In 2019, Allegiant Air flights were 7.32% on time, 0.09% cancelled, 41.03% delayed, and 51.57% late.
```

```
fprintf("In 2019, American Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delaye
```

```
In 2019, American Airline flights were 9.58% on time, 0.12% cancelled, 40.91% delayed, and 49.39% late.
```

```
fprintf("In 2019, Delta Air Line flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed,
```

```
In 2019, Delta Air Line flights were 11.10% on time, 0.01% cancelled, 43.13% delayed, and 45.76% late.
```

```
fprintf("In 2019, Endeavor Air flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed, a
```

```
In 2019, Endeavor Air flights were 8.72% on time, 0.30% cancelled, 33.92% delayed, and 57.06% late.
```

```
fprintf("In 2019, Envoy Air flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed, and
```

```
In 2019, Envoy Air flights were 11.99% on time, 0.64% cancelled, 22.08% delayed, and 38.64% late.
```

```
fprintf("In 2019, ExpressJet flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed, and
```

```
In 2019, ExpressJet flights were 7.22% on time, 0.33% cancelled, 49.11% delayed, and 43.34% late.
```

```
fprintf("In 2019, Frontier Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delaye
```

```
In 2019, Frontier Airline flights were 7.62% on time, 0.09% cancelled, 34.91% delayed, and 57.38% late.
```

```
fprintf("In 2019, Hawaiian Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delaye
```

```
In 2019, Hawaiian Airline flights were 11.53% on time, 0.02% cancelled, 57.18% delayed, and 31.26% late.
```

```
fprintf("In 2019, JetBlue flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed, and %.
```

```
In 2019, JetBlue flights were 5.63% on time, 0.09% cancelled, 43.63% delayed, and 50.66% late.
```

```
fprintf("In 2019, Mesa Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed, a
```

```
In 2019, Mesa Airline flights were 9.60% on time, 0.25% cancelled, 45.81% delayed, and 44.34% late.
```

```
fprintf("In 2019, PSA Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed, ar
```

```
In 2019, PSA Airline flights were 12.72% on time, 0.41% cancelled, 35.44% delayed, and 51.43% late.
```

```
fprintf("In 2019, Republic Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delaye
```

```
In 2019, Republic Airline flights were 9.57% on time, 0.42% cancelled, 31.59% delayed, and 58.42% late.
```

```
fprintf("In 2019, Skywest Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed
```

```
In 2019, Skywest Airline flights were 6.67% on time, 0.29% cancelled, 43.09% delayed, and 49.95% late.
```

```
fprintf("In 2019, Southwest Airline flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delay
```

```
In 2019, Southwest Airline flights were 16.25% on time, 0.58% cancelled, 37.13% delayed, and 46.04% late.
```

```
fprintf("In 2019, Spirit Air Line flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed
```

```
In 2019, Spirit Air Line flights were 16.34% on time, 0.21% cancelled, 36.66% delayed, and 46.78% late.
```

```
fprintf("In 2019, United Air Line flights were %.2f%% on time, %.2f%% cancelled, %.2f%% delayed
```

```
In 2019, United Air Line flights were 11.11% on time, 0.17% cancelled, 32.51% delayed, and 56.21% late.
```

```
fprintf("From this data: \nSpirit Air Lines had the highest percentage of on time flights.\nDel
```

```
From this data:
Spirit Air Lines had the highest percentage of on time flights.
Delta Air Lines had the lowest percentage of cancelled flights.
Envoy Air has the lowest percentage of delayed flights.
Hawaiian Airlines has the lowest percentage of late flights.
```

```
fprintf("Based on the data accumulated, we recommend you take either Spirit Air Lines or Envoy
```

```
Based on the data accumulated, we recommend you take either Spirit Air Lines or Envoy Air for your future flights!
```

```
fprintf("*Hawaiian Airlines is exempt from this decision as a majority of flights do not take p
```

```
*Hawaiian Airlines is exempt from this decision as a majority of flights do not take place in Hawaii*
```

```
fprintf("*Please keep in mind these are just RECOMMENDATIONS. This does not mean these airlines
```

```
*Please keep in mind these are just RECOMMENDATIONS. This does not mean these airlines are ALWAYS better than others
```

```
fprintf("We wish you a grand time during your vacation!\n")
```

```
We wish you a grand time during your vacation!
```

Andrew Hoang and Stanley Nguyen: Final Project

For this final project, we decided to use the flight arrival dataset. This dataset contains multiple airlines and airports with information about their plane's arrivals, delays, cancellations, etc from 2019. This data only represents a portion of all flights and airports in the US. We decided to use this dataset due to its uniqueness and help answer the question of "Which airline is best?". To answer this question, we looked at four categories in the dataset: the on time arrivals, cancelled flights, delayed flights, and late planes. We felt that these four criteria can help determine which airline is the most consistent and reliable.

Summer is approaching rapidly and that means family vacations. Many families will travel to places like Florida and California in order to have a fun time with their friends and family. In order to do this though, many families have to book flights in advanced and that can be a rather stressful process. From deciding when to take the flight, which airline to take it from, how many seats you need, planning a family trip can be quite stressful and taxing. Through this project, we hope that we can help with that stressful project by recommending certain airlines. Although this seems rather miniscule in the whole process, once you choose a certain airline, you only have to choose the date of the flight and how many seats needed. There would be no need to jump around to a multitude of different airlines. This project will analyze and determine which airlines are the most reliable for people to take so that they can have an enjoyable vacation.

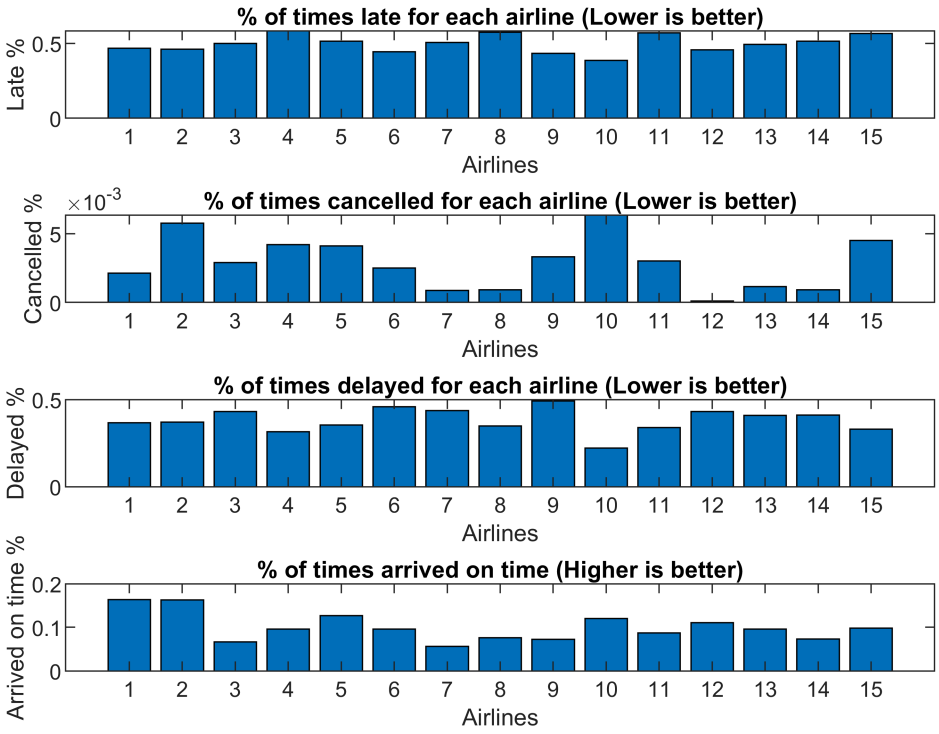
Code:

For the coding portion, we first imported the excel workbook into Matlab so we can utilize the tools and coding functions to help determine the best airline. We sectioned off each of the airlines into their own structs (they were all in order in the excel file), so we could easily maneuver between different airlines. After making structs of all the airlines, we created arrays for the categories we listed above (on time arrivals, cancellations, delays, and late planes), took the sum of each array, and then summed everything to create a number which represented all the flights of a specific airline. We did this in order to be able to obtain percentages for each category which would make it easier to determine the best airline. By taking the total of each category and dividing it by the total amount of flights of the whole airline, we were able to determine the percentage of flights of each category. This process was done for all 17 airlines.

When discussing how the program should be made, we first had ideas of just comparing the mins and maxes of each category. However, we quickly realized that wouldn't make sense as many airports have differing amount of flights each day/year. We then moved on to the percentage idea. To make it fair for all airlines, we decided to take the total sum of all the categories and divide by the respective category in order to get the percentage. This would make it fair as this method did not make the percentages rely on the size of the airports or any other factors. Instead, it was just based on the flights that were documented.

Visuals:

In order to help decipher and make the code above more digestable, we compiled the data into four graphs, each representing a certain category. This was done in the order of airlines in the above code. The visual is mainly used to help viewers clearly see the results of the code and the variance between airlines.



Printing:

After the program as complete, all that was left was to print the data. We decided to print the data for all the airlines which would then help us make a list of which airlines had the highest arrival, lowest cancellation, lowest delayed, and lowest late airplaines. From this data, we then decided from the four airlines which was the best by comparing each category. We decided to exempt Hawaiian Airlines as it had amazing numbers, but is only specific to Hawaii not the rest of the US. Finally, we were able to condense the data down to Envoy Air and Spirit Airlines being the best based off their percentages of on time flights, cancelled flights, delayed flights, and late planes. These two airlines ended up being the "recommended" airlines to take.

The data presented is very lengthy and wordy. We wanted to present it this way so the viewer can choose for themself what was the best. We did not want to definitely say that some airline was the best always and it had to be chosen. We wanted to just present data, and based off that data, have the viewer determine what was best for their current situation. Of course, we provided recommendations as some people are not willing to decipher all the data presented. Our main focus was to present the data in an organized way so that the viewer can easily see and understand everything, then based off that, determine what was best for them.

```
In 2019, Alaska Airline flights were 9.80% on time, 0.45% cancelled, 33.08% delayed, and 56.67% late.
In 2019, Allegiant Air flights were 7.32% on time, 0.09% cancelled, 41.03% delayed, and 51.57% late.
In 2019, American Airline flights were 9.58% on time, 0.12% cancelled, 40.91% delayed, and 49.39% late.
In 2019, Delta Air Line flights were 11.10% on time, 0.01% cancelled, 43.13% delayed, and 45.76% late.
In 2019, Endeavor Air flights were 8.72% on time, 0.30% cancelled, 33.92% delayed, and 57.06% late.
In 2019, Envoy Air flights were 11.99% on time, 0.64% cancelled, 22.08% delayed, and 38.64% late.
```

In 2019, ExpressJet flights were 7.22% on time, 0.33% cancelled, 49.11% delayed, and 43.34% late.

In 2019, Frontier Airline flights were 7.62% on time, 0.09% cancelled, 34.91% delayed, and 57.38% late.

In 2019, Hawaiian Airline flights were 11.53% on time, 0.02% cancelled, 57.18% delayed, and 31.26% late.

In 2019, JetBlue flights were 5.63% on time, 0.09% cancelled, 43.63% delayed, and 50.66% late.

In 2019, Mesa Airline flights were 9.60% on time, 0.25% cancelled, 45.81% delayed, and 44.34% late.

In 2019, PSA Airline flights were 12.72% on time, 0.41% cancelled, 35.44% delayed, and 51.43% late.

In 2019, Republic Airline flights were 9.57% on time, 0.42% cancelled, 31.59% delayed, and 58.42% late.

In 2019, Skywest Airline flights were 6.67% on time, 0.29% cancelled, 43.09% delayed, and 49.95% late.

In 2019, Southwest Airline flights were 16.25% on time, 0.58% cancelled, 37.13% delayed, and 46.04% late.

In 2019, Spirit Air Line flights were 16.34% on time, 0.21% cancelled, 36.66% delayed, and 46.78% late.

In 2019, United Air Line flights were 11.11% on time, 0.17% cancelled, 32.51% delayed, and 56.21% late.

From this data:
Spirit Air Lines had the highest percentage of on time flights.
Delta Air Lines had the lowest percentage of cancelled flights.
Envoy Air has the lowest percentage of delayed flights.
Hawaiian Airlines has the lowest percentage of late flights.

Based on the data accumulated, we recommend you take either Spirit Air Lines or Envoy Air for your future flights!

Hawaiian Airlines is exempt from this decision as a majority of flights do not take place in Hawaii

*Please keep in mind these are just RECOMMENDATIONS. This does not mean these airlines are ALWAYS better than others

We wish you a grand time during your vacation!