

# Final Project: BAC Calculator

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Section: 063

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# Problem Statement

- Most car accidents are a result of irresponsible drunk driving
- People may not be aware of their level of alcohol intoxication in comparison to the legal BAC limit
- Not everyone knows their limits of drinking

# Purpose

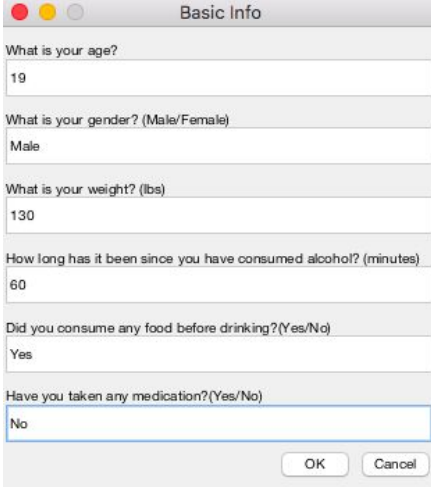
- Calculates Blood Alcohol Content
  - Takes in multiple factors (weight, number of drinks consumed, etc) and returns BAC
- Gives a plot to estimate the decrease of BAC every hour
  - Includes line that indicates what the BAC legal limit is for breathalyzer test
- Determines whether someone is sober or not

# Approach

1. Create a GUI that intakes strings as factors
2. Take the input of different types of alcohol and amount consumed
3. Create a function that computes all input factors into a BAC value
4. Create a plot graph that displays the decrease of BAC at a linear rate over time
5. Returns text containing information about input factors and how long it would until user is sober

# GUI Factor Menu

- User inputs different factors in the factor intake menu
- Displays error if input is invalid



A macOS-style dialog box titled "Basic Info" with standard red, yellow, and grey window control buttons. It contains several text input fields with labels: "What is your age?" (value: 19), "What is your gender? (Male/Female)" (value: Male), "What is your weight? (lbs)" (value: 130), "How long has it been since you have consumed alcohol? (minutes)" (value: 60), "Did you consume any food before drinking?(Yes/No)" (value: Yes), and "Have you taken any medication?(Yes/No)" (value: No). At the bottom right are "OK" and "Cancel" buttons.



A macOS-style dialog box titled "Error!" with standard red, yellow, and grey window control buttons. It contains a text label that reads "Please enter a positive integer for age." and an "OK" button at the bottom right.

# Inputting Alcohol Type and Amount Consumed

- User selects from a list of alcohol types provided on the menu
- User inputs the amount (oz) of alcohol consumed
- Spreadsheet stores ABV of each drink

Which of the following alcohol did you drink? (Ctrl+click to select)

- Beer: Bud Light
- Beer: Coors Light
- Beer: Miller Lite
- Beer: Budweiser
- Beer: Heineken
- Beer: Light, Other
- Beer: Other
- Wine: Bordeaux
- Wine: Merlot
- Wine: Pinot Noir
- Wine: Chardonnay
- Wine: Other
- Champagne
- Liquor: Jameson Irish Whiskey
- Liquor: Jack Daniels
- Liquor: Crown Royal

Select all

OK Cancel

Number of Drinks

Enter amount of each that you drank(in fl oz)  
Common measurements: One can = 12 fl. oz  
One shot = 1.5 fl. oz  
One wine glass = 5 fl. oz

How many fl. oz of Beer: Bud Light did you drink?

60

How many fl. oz of Beer: Budweiser did you drink?

24

How many fl. oz of Beer: Light, Other did you drink?

12

OK Cancel

# Calculating BAC Value

- Create a function that takes all the variables influencing alcohol intoxication
- Returns a calculated BAC value with given inputs
- Challenge: weighing the significance of each factor

```
function bac = calcBAC(alcConsumed, age, weight, gender, time, med, food)
    if lower(gender) == 'male'
        r = 0.73;
    else
        r = 0.66;
    end
    if lower(food) == 'yes'
        if time > 30
            time = time - 30;
        else
            time = 0;
        end
    end
    if age > 21
        factor = (age-21)/100 + 1;
    else
        factor = 1;
    end
    if lower(med) == 'yes'
        factor = factor + .1;
    end
    bac = ((factor * alcConsumed * 5.14) / (weight * r)) - 0.015*(time/60);
end
```

# Final Text Box

- Returns information of the user's inputs
- Tells user the BAC value
- Tells user how long it will take for them to be sober



# Plotting BAC Decrease Rate

- Shows a linear plot of BAC vs time (hr)
- Displays legal drinking limit
- Displays point of impaired driving

# Code

```
]function inputs = takeFactors()
    T = readtable('alcDrinks.xlsx', 'ReadRowNames', true);
    while true
        prompt = {'What is your age?', 'What is your gender? (Male/Female)', ...
            'What is your weight? (lbs)', 'How long has it been since you have consumed alcohol? (minutes)', ...
            'Did you consume any food before drinking?(Yes/No)', 'Have you taken any medication?(Yes/No)'};
        userInfoCell = inputdlg(prompt, 'Basic Info', 1);
        [~, tf1] = str2num(userInfoCell{1});
        if ~tf1
            uiwait(msgbox('Please enter a positive integer for age.', 'Error!'));
            continue;
        end
    end
```

```
    alcConsumed = sum([alcoholAmounts{:}]);
    age = personalFactors{1,1};
    weight = personalFactors{1,2};
    gender = string(personalFactors{1,3});
    time = personalFactors{1,4};
    food = string(personalFactors{1,5});
    med = string(personalFactors{1,6});

    BAC = calcBAC(alcConsumed, age, weight, gender, time, med, food);
    if BAC < 0
        BAC = 0;
    end

    if lower(food) == 'yes'
        foodStr = 'You ate food before drinking.';
    else
        foodStr = 'You did not eat before drinking.';
    end
    if lower(med) == 'yes'
        medStr = 'You had medicine before drinking.';
    else
        medStr = 'You did not have medicine before drinking.';
    end
    messageString = { 'You are a ' + string(age) + ' year old ' + gender + ', who weighs ' + string(weight) + ' lbs, ' +
        foodStr, medStr, 'It has been ' + string(time) + ' minutes since you drank.', ...
        'You have consumed ' + string(round(alcConsumed,2)) + ' ounces of alcohol, causing ' + string(round(BAC,2)) + ' BAC. ' +
        'You will be completely sober in ' + string(floor(BAC/0.016)) + ' hours and ' + string(ceil(((BAC/0.016)-floor(BAC/0.016))*60)) + ' minutes.' };
    uiwait(msgbox(messageString, 'Summary'));
```

```
]function bac = calcBAC(alcConsumed, age, weight, gender, time, med, food)
    if lower(gender) == 'male'
        r = 0.73;
    else
        r = 0.66;
    end
    if lower(food) == 'yes'
        if time > 30
            time = time - 30;
        else
            time = 0;
        end
    end
    if age > 21
        factor = (age-21)/100 + 1;
    else
        factor = 1;
    end
    if lower(med) == 'yes'
        factor = factor + .1;
    end
    bac = ((factor * alcConsumed * 5.14) / (weight * r)) - 0.015*(time/60);
end
```

```
endNum = ceil(BAC/0.016);
for t = 1:endNum
    if BAC > 0
        BAC = BAC - .016;
        if BAC < 0
            BAC = 0;
        end
    else
        BAC = 0;
    end
    y1(t) = BAC;
end

for i = 1:endNum
    elaptime = timestart + (i - 1);
    x1(i) = elaptime;
end

for i = 1:endNum
    alclim = .08;
    y2(i) = alclim;
end

for i = 1:endNum
    impaired = .04;
    y3(i) = impaired;
end

plot(x1, y1, x1, y2, x1, y3)
```

# Concepts Used

- Loops - incorporated with BAC graph to plot linear points
- Plots - takes BAC value from user and shows change in BAC per hour
- String Manipulation - intaking string in GUI and returns text
- GUIs - receives inputs of different variables that affect alcohol intoxication
- If else statements - used with returning text to user
- Functions - created to calculate value for BAC
- Cell arrays - used to store values of x and y on graph to be plotted

# Conclusion

Our code will help drinkers know their BAC level

Drinkers will:

- Make smarter decisions on intaking alcohol
- Know if they are above the legal limit

# Sources

[http://www.brad21.org/bac\\_charts.html](http://www.brad21.org/bac_charts.html)

<http://celtickane.com/projects/blood-alcohol-content-bac-calculator/>

<https://www.go2hr.ca/sites/default/files/legacy/pdf/go2HR-SIR-Tip-Sheet-Factors-That-Influence-Intoxication.pdf>