Bios 6301: Homework 7

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Due Thursday, 02 November, 1:00 PM

$5^{n=day}$ points taken off for each day late.

40 points total.

Submit a single knitr file (named `homework7.rmd`), along with a valid PDF output file. Inside the file, clearly indicate which parts of your responses go with which problems (you may use the original homework document as a template). Add your name as `author` to the file's metadata section. Raw R code/output or word processor files are not acceptable.

Failure to name file `homework7.rmd` or include author name may result in 5 points taken off.

Question 1

21 points

Use the following code to generate data for patients with repeated measures of A1C (a test for levels of blood glucose).

```r
genData <- function(n) {
    if(exists(".Random.seed", envir = .GlobalEnv)) {
        save.seed <- get(".Random.seed", envir= .GlobalEnv)
        on.exit(assign(".Random.seed", save.seed, envir = .GlobalEnv))
    } else {
        on.exit(rm(".Random.seed", envir = .GlobalEnv))
    }
    set.seed(n)
    subj <- ceiling(n / 10)
    id <- sample(subj, n, replace=TRUE)
    times <- as.integer(difftime(as.POSIXct("2005-01-01"), as.POSIXct("2000-01-01"), units='secs'))
    dt <- as.POSIXct(sample(times, n), origin='2000-01-01')
    mu <- runif(subj, 4, 10)
    a1c <- unsplit(mapply(rnorm, tabulate(id), mu, SIMPLIFY=FALSE), id)
    data.frame(id, dt, a1c)
}
x <- genData(500)
```

```r
#2. For each `id`, determining if there is more than a one year gap in between observations.
#Adding a new row at the one year mark (two for two years, etc.), with the `a1c`
#value set to missing.

addMissingRows <- function(data) {
  result <- vector("list", length = nrow(data))
  k <- 1
  data <- data[order(data$id, data$dt), ]  #1. Ordering the data set by `id` and `dt`.

  for (i in unique(data$id)) {
    temp_data <- data[data$id == i, ]
    temp_data$dt <- as.POSIXct(temp_data$dt)
    temp_data <- temp_data[order(temp_data$dt), ]

    for (j in 1:(nrow(temp_data) - 1)) {
      time_diff <- as.numeric(difftime(temp_data$dt[j + 1], temp_data$dt[j], units = "days"))
      if (!is.na(time_diff) && time_diff >= 365) {
        num_missing_years <- floor(time_diff / 365)
        for (m in 1:(num_missing_years - 1)) {
          if (m == 1) {
            new_dt <- as.POSIXct(temp_data$dt[j] + as.difftime(365 * m, units = "days"))
            new_row <- data.frame(id = i, dt = new_dt, a1c = NA)
            temp_data <- rbind(temp_data[1:j, ], new_row, temp_data[(j + 1):nrow(temp_data), ])
            j <- j + 1
          }
        }
      }
    }
    result[[k]] <- temp_data
    k <- k + 1
  }

  result <- do.call(rbind, result)
  return(result)
}

x <- addMissingRows(x)

#3. Creating a new column `visit`.  For each `id`, adding the visit number from
#1 to n depending on the number of observations for each individual. Observations
#created with missing a1c values are included.
x$visit <- ave(x$id, x$id, FUN = seq_along)

#4. For each `id`, determining and replacing missing values with the
#mean `a1c` value for each individual.
mean_a1c <- aggregate(a1c ~ id, data = x, FUN = function(x) mean(x, na.rm = TRUE))

for (i in 1:nrow(mean_a1c)) {
  id_val <- mean_a1c[i, "id"]
  mean_val <- mean_a1c[i, "a1c"]
  x$a1c[x$id == id_val & is.na(x$a1c)] <- mean_val
}

#5.Printing the mean a1c for each id.
print(mean_a1c)
```

```
##   id      a1c
## 1  1 6.654444
## 2  2 9.789132
## 3  3 6.951820
## 4   4  8.191985
## 5   5  9.429694
## 6   6  7.133443
## 7   7  7.879138
## 8   8  6.244061
## 9   9  4.420523
## 10 10  6.028370
## 11 11  4.838279
## 12 12  6.691181
## 13 13  8.504632
## 14 14  9.122968
## 15 15  6.737092
## 16 16  7.420245
## 17 17  6.546329
## 18 18  6.151311
## 19 19  8.628037
## 20 20  8.923518
## 21 21  5.444430
## 22 22  5.763931
## 23 23  6.351112
## 24 24  9.377525
## 25 25  5.058097
## 26 26  8.692078
## 27 27  7.371831
## 28 28  4.243469
## 29 29  6.345254
## 30 30  4.135795
## 31 31  8.670622
## 32 32  5.130167
## 33 33  6.528153
## 34 34  8.445030
## 35 35  3.832195
## 36 36  9.514603
## 37 37  8.612608
## 38 38 10.160773
## 39 39  8.976697
## 40 40  7.583232
## 41 41  3.804325
## 42 42  6.787170
## 43 43  5.654235
## 44 44  5.613283
## 45 45  8.876623
## 46 46  7.485824
## 47 47  4.752133
## 48 48  7.415459
## 49 49  5.562809
## 50 50  4.970288
```

```
#6.Calculating and printing the total number of visits for each id.
total_visits <- aggregate(visit ~ id, data = x, FUN = length)

print(total_visits)
```

```
##    id visit
## 1   1      7
## 2   2     16
## 3   3     13
## 4   4      9
## 5   5     14
## 6   6     11
## 7   7      7
## 8   8     12
## 9   9     15
## 10  10     8
## 11  11    12
## 12  12    12
## 13  13     9
## 14  14    12
## 15  15    10
## 16  16     8
## 17  17     9
## 18  18    14
## 19  19    10
## 20  20    11
## 21  21    13
## 22  22    12
## 23  23    10
## 24  24    12
## 25  25    16
## 26  26    11
## 27  27    10
## 28  28    15
## 29  29     3
## 30  30    13
## 31  31    11
## 32  32     9
## 33  33    12
## 34  34    11
## 35  35    11
## 36  36     9
## 37  37     8
## 38  38    14
## 39  39    14
## 40  40    10
## 41  41    14
## 42  42    11
## 43  43     8
## 44  44    12
## 45  45     6
## 46  46    12
## 47  47    10
## 48  48     5
## 49  49    11
## 50  50     9
```

```
#7.Printing the observations for id = 15.
print(x[x$id == 15, ])
```

```
##     id                  dt      a1c visit
## 300 15 2000-10-21 01:08:17 7.401322     1
## 127 15 2001-08-08 14:23:08 5.896318     2
## 165 15 2001-08-15 07:03:29 7.457722     3
## 109 15 2002-03-15 21:23:10 5.330917     4
## 319 15 2002-04-14 09:08:25 6.484003     5
## 255 15 2002-10-10 18:27:43 8.139101     6
## 224 15 2003-02-19 12:58:53 6.446557     7
## 481 15 2003-03-02 06:58:10 7.432291     8
## 425 15 2003-06-30 07:20:49 7.113792     9
## 259 15 2004-01-22 20:30:42 5.668897    10
```

Question 2

16 points

Install the `lexicon` package. Load the `sw_fry_1000` vector, which contains 1,000 common words.

```
options(repos = c(CRAN = "http://cran.rstudio.com/"))


install.packages("lexicon")
```

```
## Installing package into 'C:/Users/ashle/AppData/Local/R/win-library/4.3'
## (as 'lib' is unspecified)
```

```
## package 'lexicon' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##  C:\Users\ashle\AppData\Local\Temp\RtmpAtOcTv\downloaded_packages
```

```
library(lexicon)
data('sw_fry_1000', package = 'lexicon')
head(sw_fry_1000)
```

```
## [1] "the" "of"  "to"  "and" "a"   "in"
```

```
#1. Removing all non-alphabetical characters and making all characters lowercase.
#Saving the result as a.

a <- tolower(gsub("[^[:alpha:]]", "", sw_fry_1000))
save(a, file = "a.RData")
print(a)
```

```
##    [1] "the"         "of"          "to"          "and"         "a"
##    [6] "in"          "is"          "it"          "you"         "that"
##   [11] "he"          "was"         "for"         "on"          "are"
##   [16] "with"        "as"          "i"           "his"         "they"
##   [21] "be"          "at"          "one"         "have"        "this"
##   [26] "from"        "or"          "had"         "by"          "hot"
##   [31] "word"        "but"         "what"        "some"        "we"
##   [36] "can"         "out"         "other"       "were"        "all"
##   [41] "there"       "when"        "up"          "use"         "your"
##   [46] "how"         "said"        "an"          "each"        "she"
##   [51] "which"       "do"          "their"       "time"        "if"
##   [56] "will"        "way"         "about"       "many"        "then"
##   [61] "them"        "write"       "would"       "like"        "so"
##   [66] "these"       "her"         "long"        "make"        "thing"
##   [71] "see"         "him"         "two"         "has"         "look"
##   [76] "more"        "day"         "could"       "go"          "come"
##   [81] "did"         "number"      "sound"       "no"          "most"
##   [86] "people"      "my"          "over"        "know"        "water"
##   [91] "than"        "call"        "first"       "who"         "may"
##   [96] "down"        "side"        "been"        "now"         "find"
##  [101] "any"         "new"         "work"        "part"        "take"
##  [106] "get"         "place"       "made"        "live"        "where"
##  [111] "after"       "back"        "little"      "only"        "round"
##  [116] "man"         "year"        "came"        "show"        "every"
##  [121] "good"        "me"          "give"        "our"         "under"
##  [126] "name"        "very"        "through"     "just"        "form"
##  [131] "sentence"    "great"       "think"       "say"         "help"
##  [136] "low"         "line"        "differ"      "turn"        "cause"
##  [141] "much"        "mean"        "before"      "move"        "right"
##  [146] "boy"         "old"         "too"         "same"        "tell"
##  [151] "does"        "set"         "three"       "want"        "air"
##  [156] "well"        "also"        "play"        "small"       "end"
##  [161] "put"         "home"        "read"        "hand"        "port"
##  [166] "large"       "spell"       "add"         "even"        "land"
##  [171] "here"        "must"        "big"         "high"        "such"
##  [176] "follow"      "act"         "why"         "ask"         "men"
##  [181] "change"      "went"        "light"       "kind"        "off"
##  [186] "need"        "house"       "picture"     "try"         "us"
##  [191] "again"       "animal"      "point"       "mother"      "world"
##  [196] "near"        "build"       "self"        "earth"       "father"
##  [201] "head"        "stand"       "own"         "page"        "should"
##  [206] "country"     "found"       "answer"      "school"      "grow"
##  [211] "study"       "still"       "learn"       "plant"       "cover"
##  [216] "food"        "sun"         "four"        "between"     "state"
##  [221] "keep"        "eye"         "never"       "last"        "let"
##  [226] "thought"     "city"        "tree"        "cross"       "farm"
##  [231] "hard"        "start"       "might"       "story"       "saw"
##  [236] "far"         "sea"         "draw"        "left"        "late"
##  [241] "run"         "dont"        "while"       "press"       "close"
##  [246] "night"       "real"        "life"        "few"         "north"
##  [251] "open"        "seem"        "together"    "next"        "white"
##  [256] "children"    "begin"       "got"         "walk"        "example"
##  [261] "ease"        "paper"       "group"       "always"      "music"
##  [266] "those"       "both"        "mark"        "often"       "letter"
##  [271] "until"       "mile"        "river"       "car"         "feet"
##  [276] "care"        "second"      "book"        "carry"       "took"
##  [281] "science"     "eat"         "room"        "friend"      "began"
##  [286] "idea"        "fish"        "mountain"    "stop"        "once"
##  [291] "base"        "hear"        "horse"       "cut"         "sure"
##  [296] "watch"       "color"       "face"        "wood"        "main"
##  [301] "enough"      "plain"       "girl"        "usual"       "young"
##  [306] "ready"       "above"       "ever"        "red"         "list"
##  [311] "though"      "feel"        "talk"        "bird"        "soon"
##  [316] "body"        "dog"         "family"      "direct"      "pose"
##  [321] "leave"       "song"        "measure"     "door"        "product"
##  [326] "black"       "short"       "numeral"     "class"       "wind"
##  [331] "question"    "happen"      "complete"    "ship"        "area"
##  [336] "half"        "rock"        "order"       "fire"        "south"
##  [341] "problem"     "piece"       "told"        "knew"        "pass"
##  [346] "since"       "top"         "whole"       "king"        "space"
##  [351] "heard"       "best"        "hour"        "better"      "true"
##  [356] "during"      "hundred"     "five"        "remember"    "step"
##  [361] "early"       "hold"        "west"        "ground"      "interest"
##  [366] "reach"       "fast"        "verb"        "sing"        "listen"
##  [371] "six"         "table"       "travel"      "less"        "morning"
##  [376] "ten"         "simple"      "several"     "vowel"       "toward"
##  [381] "war"         "lay"         "against"     "pattern"     "slow"
##  [386] "center"      "love"        "person"      "money"       "serve"
##  [391] "appear"      "road"        "map"         "rain"        "rule"
##  [396] "govern"      "pull"        "cold"        "notice"      "voice"
##  [401] "unit"        "power"       "town"        "fine"        "certain"
##  [406] "fly"         "fall"        "lead"        "cry"         "dark"
##  [411] "machine"     "note"        "wait"        "plan"        "figure"
##  [416] "star"        "box"         "noun"        "field"       "rest"
##  [421] "correct"     "able"        "pound"       "done"        "beauty"
##  [426] "drive"       "stood"       "contain"     "front"       "teach"
##  [431] "week"        "final"       "gave"        "green"       "oh"
##  [436] "quick"       "develop"     "ocean"       "warm"        "free"
##  [441] "minute"      "strong"      "special"     "mind"        "behind"
##  [446] "clear"       "tail"        "produce"     "fact"        "street"
##  [451] "inch"        "multiply"    "nothing"     "course"      "stay"
##  [456] "wheel"       "full"        "force"       "blue"        "object"
##  [461] "decide"      "surface"     "deep"        "moon"        "island"
##  [466] "foot"        "system"      "busy"        "test"        "record"
##  [471] "boat"        "common"      "gold"        "possible"    "plane"
##  [476] "stead"       "dry"         "wonder"      "laugh"       "thousand"
##  [481] "ago"         "ran"         "check"       "game"        "shape"
##  [486] "equate"      "hot"         "miss"        "brought"     "heat"
##  [491] "snow"        "tire"        "bring"       "yes"         "distant"
##  [496] "fill"        "east"        "paint"       "language"    "among"
##  [501] "grand"       "ball"        "yet"         "wave"        "drop"
##  [506] "heart"       "am"          "present"     "heavy"       "dance"
##  [511] "engine"      "position"    "arm"         "wide"        "sail"
##  [516] "material"    "size"        "vary"        "settle"      "speak"
##  [521] "weight"      "general"     "ice"         "matter"      "circle"
##  [526] "pair"        "include"     "divide"      "syllable"    "felt"
##  [531] "perhaps"     "pick"        "sudden"      "count"       "square"
##  [536] "reason"      "length"      "represent"   "art"         "subject"
##  [541] "region"      "energy"      "hunt"        "probable"    "bed"
##  [546] "brother"     "egg"         "ride"        "cell"        "believe"
##  [551] "fraction"    "forest"      "sit"         "race"        "window"
##  [556] "store"       "summer"      "train"       "sleep"       "prove"
##  [561] "lone"        "leg"         "exercise"    "wall"        "catch"
##  [566] "mount"       "wish"        "sky"         "board"       "joy"
##  [571] "winter"      "sat"         "written"     "wild"        "instrument"
##  [576] "kept"        "glass"       "grass"       "cow"         "job"
##  [581] "edge"        "sign"        "visit"       "past"        "soft"
##  [586] "fun"         "bright"      "gas"         "weather"     "month"
##  [591] "million"     "bear"        "finish"      "happy"       "hope"
##  [596] "flower"      "clothe"      "strange"     "gone"        "jump"
##  [601] "baby"        "eight"       "village"     "meet"        "root"
##  [606] "buy"         "raise"       "solve"       "metal"       "whether"
##  [611] "push"        "seven"       "paragraph"   "third"       "shall"
##  [616] "held"        "hair"        "describe"    "cook"        "floor"
##  [621] "either"      "result"      "burn"        "hill"        "safe"
##  [626] "cat"         "century"     "consider"    "type"        "law"
##  [631] "bit"         "coast"       "copy"        "phrase"      "silent"
##  [636] "tall"        "sand"        "soil"        "roll"        "temperature"
##  [641] "finger"      "industry"    "value"       "fight"       "lie"
##  [646] "beat"        "excite"      "natural"     "view"        "sense"
##  [651] "ear"         "else"        "quite"       "broke"       "case"
##  [656] "middle"      "kill"        "son"         "lake"        "moment"
##  [661] "scale"       "loud"        "spring"      "observe"     "child"
##  [666] "straight"    "consonant"   "nation"      "dictionary"  "milk"
##  [671] "speed"       "method"      "organ"       "pay"         "age"
##  [676] "section"     "dress"       "cloud"       "surprise"    "quiet"
##  [681] "stone"       "tiny"        "climb"       "cool"        "design"
##  [686] "poor"        "lot"         "experiment"  "bottom"      "key"
##  [691] "iron"        "single"      "stick"       "flat"        "twenty"
##  [696] "skin"        "smile"       "crease"      "hole"        "trade"
##  [701] "melody"      "trip"        "office"      "receive"     "row"
##  [706] "mouth"       "exact"       "symbol"      "die"         "least"
##  [711] "trouble"     "shout"       "except"      "wrote"       "seed"
##  [716] "tone"        "join"        "suggest"     "clean"       "break"
##  [721] "lady"        "yard"        "rise"        "bad"         "blow"
##  [726] "oil"         "blood"       "touch"       "grew"        "cent"
##  [731] "mix"         "team"        "wire"        "cost"        "lost"
##  [736] "brown"       "wear"        "garden"      "equal"       "sent"
##  [741] "choose"      "fell"        "fit"         "flow"        "fair"
##  [746] "bank"        "collect"     "save"        "control"     "decimal"
##  [751] "sight"       "gentle"      "woman"       "captain"     "practice"
##  [756] "separate"    "difficult"   "doctor"      "please"      "protect"
##  [761] "noon"        "whose"       "locate"      "ring"        "character"
##  [766] "insect"      "caught"      "period"      "indicate"    "radio"
##  [771] "spoke"       "atom"        "human"       "history"     "effect"
##  [776] "electric"    "expect"      "crop"        "modern"      "element"
##  [781] "hit"         "student"     "corner"      "party"       "supply"
##  [786] "bone"        "rail"        "imagine"     "provide"     "agree"
##  [791] "thus"        "capital"     "wont"        "chair"       "danger"
##  [796] "fruit"       "rich"        "thick"       "soldier"     "process"
##  [801] "operate"     "guess"       "necessary"   "sharp"       "wing"
##  [806] "create"      "neighbor"    "wash"        "bat"         "rather"
##  [811] "crowd"       "corn"        "compare"     "poem"        "string"
##  [816] "bell"        "depend"      "meat"        "rub"         "tube"
##  [821] "famous"      "stream"      "fear"        "thin"        "triangle"
##  [826] "planet"      "hurry"       "chief"       "colony"      "clock"
##  [831] "mine"        "tie"         "enter"       "major"       "fresh"
##  [836] "search"      "send"        "yellow"      "gun"         "rose"
##  [841] "allow"       "print"       "dead"        "spot"        "desert"
##  [846] "suit"        "current"     "lift"        "continue"    "block"
##  [851] "chart"       "hat"         "sell"        "success"     "company"
##  [856] "subtract"    "event"       "particular"  "deal"        "swim"
##  [861] "term"        "opposite"    "wife"        "shoe"        "shoulder"
##  [866] "spread"      "arrange"     "camp"        "invent"      "cotton"
##  [871] "born"        "determine"   "quart"       "nine"        "truck"
##  [876] "noise"       "level"       "chance"      "gather"      "shop"
##  [881] "stretch"     "throw"       "shine"       "property"    "column"
##  [886] "molecule"    "select"      "wrong"       "gray"        "repeat"
##  [891] "require"     "broad"       "prepare"     "salt"        "nose"
##  [896] "plural"      "anger"       "claim"       "continent"   "oxygen"
##  [901] "sugar"       "death"       "pretty"      "skill"       "women"
##  [906] "season"      "solution"    "magnet"      "silver"      "thank"
##  [911] "branch"      "match"       "suffix"      "especially"  "fig"
##  [916] "afraid"      "huge"        "sister"      "steel"       "dollar"
##  [921] "discuss"     "forward"     "similar"     "guide"       "experience"
##  [926] "score"       "apple"       "bought"      "led"         "pitch"
##  [931] "coat"        "mass"        "card"        "band"        "rope"
##  [936] "slip"        "win"         "dream"       "evening"     "condition"
##  [941] "feed"        "tool"        "total"       "basic"       "smell"
##  [946] "valley"      "nor"         "double"      "seat"        "arrive"
##  [951] "master"      "track"       "parent"      "shore"       "division"
##  [956] "sheet"       "substance"   "favor"       "connect"     "post"
##  [961] "spend"       "chord"       "fat"         "glad"        "original"
##  [966] "share"       "station"     "dad"         "bread"       "charge"
##  [971] "proper"      "bar"         "offer"       "segment"     "slave"
##  [976] "duck"        "instant"     "market"      "degree"      "populate"
##  [981] "chick"       "dear"        "enemy"       "reply"       "drink"
##  [986] "occur"       "support"     "speech"      "nature"      "range"
##  [991] "steam"       "motion"      "path"        "liquid"      "log"
##  [996] "meant"       "quotient"    "teeth"       "shell"       "neck"
```

```r
#2. Determining the number of words containing the string "ar".
count <- sum(grepl("ar", a))
print(count)
```

```
## [1] 64
```

```r
#3. Finding a six-letter word that starts with "l" and ends with "r".
six_letter_word <- a[grep("^l[a-z]{4}r$", a)]
print(six_letter_word)
```

```
## [1] "letter"
```

```r
#4. Returning all words starting with "col" or end with "eck".
result <- a[grep("^col|eck$", a)]
print(result)
```

```
## [1] "color"   "cold"    "check"   "collect" "colony"  "column"  "neck"
```

```r
#5. Finding the number of words that contain 4 or more
#consonants (with y included as a consonant).
pattern <- "(.*[bcdfghjklmnpqrstvwxyz]{4,}.*)"
count <- sum(grepl(pattern, a))
print(count)
```

```
## [1] 8
```

```r
#6 Returning all words that have a "q" not followed by a "ui".
result <- a[grep("q(?!ui)", a, perl = TRUE)]
print(result)
```

```
## [1] "question" "equate"   "square"   "equal"    "quart"    "quotient"
```

```r
#7. Finding all words that contain "k" followed by another letter.
#Running table command on first character following first "k" of each word.
matches <- grep("k[A-Za-z]", a, value = TRUE)

following_chars <- regmatches(matches, regexpr("(?<=k).", matches, perl = TRUE))

char_table <- table(following_chars)

print(char_table)
```

```
## following_chars
##  e  i  n  y 
## 10  5  2  1
```

```r
#Removing all vowels and determining the number of character strings found once.
a_no_vowels <- gsub("[aeiou]", "", a)

unique_count <- length(which(table(a_no_vowels) == 1))

print(unique_count)
```

```
## [1] 581
```

3 points

The first argument to most functions that fit linear models are formulas. The following example defines the response variable death and allows the model to incorporate all other variables as terms. . is used to mean all columns not otherwise in the formula.

```r
url <- "https://github.com/couthcommander/Bios6301/raw/main/datasets/haart.csv"
haart_df <- read.csv(url)[,c('death','weight','hemoglobin','cd4baseline')]
coef(summary(glm(death ~ ., data=haart_df, family=binomial(logit))))
```

```
##                 Estimate  Std. Error   z value     Pr(>|z|)
## (Intercept)  3.576411744 1.226870535  2.915069 0.0035561039
## weight      -0.046210552 0.022556001 -2.048703 0.0404911395
## hemoglobin  -0.350642786 0.105064078 -3.337418 0.0008456055
## cd4baseline  0.002092582 0.001811959  1.154872 0.2481427160
```

Now imagine running the above several times, but with a different response and data set each time. Here's a function:

```
myfun <- function(dat, response) {
  form <- as.formula(response ~ .)
  coef(summary(glm(form, data=dat, family=binomial(logit))))
}
```

Unfortunately, it doesn't work. `tryCatch` is "catching" the error so that this file can be knit to PDF.

```
tryCatch(myfun(haart_df, death), error = function(e) e)
```

```
## <simpleError in eval(expr, envir, enclos): object 'death' not found>
```

```
#1.  Debugging the myfun function
debug(myfun)
tryCatch(myfun(haart_df, "death"), error = function(e) e)
```

```
## debugging in: myfun(haart_df, "death")
## debug at <text>#1: {
##     form <- as.formula(response ~ .)
##     coef(summary(glm(form, data = dat, family = binomial(logit))))
## }
## debug at <text>#2: form <- as.formula(response ~ .)
## debug at <text>#3: coef(summary(glm(form, data = dat, family = binomial(logit))))
```

```
## <simpleError in model.frame.default(formula = form, data = dat, drop.unused.levels = TRUE): variable
```

```
#through debugging, an error message is recieved that indicates
#that variable lengths differ.
#I believe this is due to the as.formula(response~.) section, which indicates
#that a variable 'response' should appear as a column in dat. The formula construction
#uses a character string and therefore does not recognize the variable 'response'
#as a column of dat. The 'variable lengths differ' error message is due to the
#function not being able to find the response variable in the dataset.
```

```
#bonus. creating a working function.

url <- "https://github.com/couthcommander/Bios6301/raw/main/datasets/haart.csv"
haart_df <- read.csv(url)[,c('death','weight','hemoglobin','cd4baseline')]
coef(summary(glm(death ~ ., data=haart_df, family=binomial(logit))))
```

```
##                 Estimate  Std. Error   z value     Pr(>|z|)
## (Intercept)  3.576411744 1.226870535  2.915069 0.0035561039
## weight      -0.046210552 0.022556001 -2.048703 0.0404911395
## hemoglobin  -0.350642786 0.105064078 -3.337418 0.0008456055
## cd4baseline  0.002092582 0.001811959  1.154872 0.2481427160
```

```r
myfun <- function(dat, response) {
  form <- as.formula(paste(response, "~ ."))
  coef(summary(glm(form, data=dat, family=binomial(logit))))
}
# Creating a sample dataset
set.seed(123)
n <- 100
dat <- data.frame(
  response = sample(c(0, 1), n, replace = TRUE),
  x1 = rnorm(n),
  x2 = rnorm(n),
  x3 = rnorm(n)
)

# Testing the function
result <- myfun(dat, "response")
print(result)
```

```
##               Estimate Std. Error     z value  Pr(>|z|)
## (Intercept) -0.2999208  0.2058900 -1.45670420 0.1451981
## x1          -0.0165579  0.2119459 -0.07812323 0.9377300
## x2          -0.2360786  0.2257802 -1.04561263 0.2957399
## x3           0.1263709  0.2077793  0.60819758 0.5430564
```