

## Encryption Assignment:

### Question# 1

#### Part A

- Create some algorithm to attempt to decode the message
- Try all 25 shift values with a sample test and print out the results

Replit Link: <https://replit.com/@mecpsTealsJava/CaesarCipherDecryption-1#main.py>

key=17

PLAINTEXT:

KATHERINEJOHNSONBIOGRAPHYBIOGRAPHYBYMARGOTLEESHETTERLYBEINGHANDPICKEDTOBEONEOFTHREEBLACKSTUDENTSTOINTEGRATEWESTVIRGINIASGRADUATESCHOOLSIS SOMETHINGTHATMANYPEOPLEWOULDCONSIDERONEOFTHEIRLIFESMOSTNOTABLEMOMENTS BUTITSJUSTONEOFSEVERALBREAKTHROUGHSTHATHAVEMARKEDKATHERINEJOHNSONSLONGANDREMARKABLELIFEBORNINWHITE SULPHURSPRINGSWESTVIRGINIAINHERINTENSECURIOSITYANDBRILLIANCEWITHNUMBERSVAULTEDHERAHEADSEVERALGRADESINSCHOOLBYSHEWASATTENDINGTHEHIGHSCHOOLONTHECAMPUSOFHISTORICALLYBLACKWESTVIRGINIASTATECOLLEGEATSHEENROLLEDINTHECOLLEGEITSELFWHERE SHEMADEQUICKWORKOFTHESCHOOLSMATHCURRICULUMANDFOUNDAMENTORINMATHPROFESSORWWSCHIEFFELINCLAYTORTHE THIRDAFRICANAMERICANTOEARNAPHDINMATHEMATICSSHEGRADUATEDWITHHIGHESTHONORSINANDTOOKAJOBTEACHINGATABLACKPUBLICSCHOOLINVIRGINIAWHENWESTVIRGINIADECIDEDTOQUIETLYINTEGRATEITSGRADUATESCHOOLSINWESTVIRGINIASTATESPRESIDENTDRJOHNWDAVISSELECTEDHERANDTWO WOMBETHEFIRSTBLACKSTUDENTSOFFEREDSPOTSATTHESTATESFLAGSHIP SCHOOLWESTVIRGINIAUNIVERSITYSHELEFTHERTEACHINGJOBANDENROLLEDINTHEGRADUATEMATHPROGRAMATTHEENDOFTHEFIRSTSESSIONHOWEVERSHEDECIDEDTOLEAVESCHOOLTOSTARTAFAMILYWITHHERFIRSTHUSBANDJAMESGOBLESHERETURNEDTOTEACHINGWHENHERTHREEDAUGHTERSGOTOLDERBUTITWASNTUNTILTHATARELATIVETOLDHERABOUTOPENPOSITIONSATTHEALLBLACKWESTAREACOMPUTINGSECTIONATTHENATIONALADVISORYCOMMITTEEFORAERONAUTICSNACAS LANGLEYLABORATORYHEADED BYFELLOWWESTVIRGINIAN DOROTHYVAUGHANKATHERINEANDHERHUSBANDDECIDEDTOMOVETHEFAMILYTONEWPORTNEWSVIRGINIATOPURSUETHEOPPORTUNITYANDKATHERINEBEGANWORKATLANGLEYINTHE SUMMEROFJUSTTWO WEEKSINTOHERTENUREINTHEOFFICEDOROTHYVAUGHANASSIGNEDHERTOAPROJECTINTHEMANEUVERLOADSBRANCHOFTHELIGHTRESEARCHDIVISIONANDKATHERINESTEMPORARYPOSITIONSOONBECAMEPERMANENTSHESPENTTHENEXTFOURYEARSANALYZINGDATAFROMFLIGHTTESTSANDWORKEDONTHEINVESTIGATIONOFAPLANE CRASHCAUSED BYWAKE TURBULENCEASSHEWASWRAPPINGUPTHISWORKHERHUSBANDDIEDOFCANCERINDECEMBER

THE LAUNCH OF THE SOVIET SATELLITE SPUTNIK CHANGED HISTORY AND JOHNSON SLIFE IN SHE PROVIDED SOME OF THE MATH FOR THE DOCUMENT NOTES ON SPACE TECHNOLOGY A COMPENDIUM OF A SERIES OF LECTURES GIVEN BY ENGINEERS IN THE FLIGHT RESEARCH DIVISION AND THE PILOTLESS AIRCRAFT RESEARCH DIVISION. PAR DENGIN EERS FROM THOSE GROUPS FORMED THE CORE OF THE SPACE TASK GROUP. THEN A NASA FIRST OFFICIAL FORAY INTO SPACE TRAVEL. JOHNSON WHO HAD WORKED WITH MANY OF THEM SINCE COMING TO LANGLEY CAME ALONG WITH THE PROGRAM. AS THEN A NASA CABECAMENASA LATER THAT YEAR SHE DID TRAJECTORY ANALYSIS FOR ALAN SHEPARD'S MAY MISSION FREEDOM AMERICA'S FIRST HUMAN SPACE FLIGHT. IN SHE AND ENGINEER TED SKOPINSKI CO-AUTHORED DETERMINATION OF AZIMUTH ANGLE AT BURNOUT FOR PLACING A SATELLITE OVER A SELECTED EARTH POSITION. A REPORT LAYING OUT THE EQUATIONS DESCRIBING AN ORBITAL SPACE FLIGHT IN WHICH THE LANDING POSITION OF THE SPACECRAFT IS SPECIFIED. IT WAS THE FIRST TIME A WOMAN IN THE FLIGHT RESEARCH DIVISION HAD RECEIVED CREDIT AS AN AUTHOR OF A RESEARCH REPORT. IN A NASA PREPARED FOR THE ORBITAL MISSION OF JOHN GLENN. JOHNSON WAS CALLED UPON TO DO THE WORK THAT SHE WOULD BECOME MOST KNOWN FOR THE COMPLEXITY OF THE ORBITAL FLIGHT HAD REQUIRED THE CONSTRUCTION OF A WORLDWIDE COMMUNICATIONS NETWORK LINKING TRACKING STATIONS AROUND THE WORLD TO IBM COMPUTERS IN WASHINGTON, CAPE CANAVERAL IN FLORIDA AND BERMUDA. THE COMPUTERS HAD BEEN PROGRAMMED WITH THE ORBITAL EQUATIONS THAT WOULD CONTROL THE TRAJECTORY OF THE CAPSULE IN GLENN'S FRIENDSHIP MISSION FROM LIFT OFF TO SPLASHDOWN. BUT THE ASTRONAUTS WERE WARY OF PUTTING THEIR LIVES IN THE CARE OF THE ELECTRONIC CALCULATING MACHINES WHICH WERE PRONE TO HICCUPS AND BLACKOUTS AS A PART OF THE PRE-FLIGHT CHECKLIST. GLENN ASKED ENGINEERS TO GET THE GIRL JOHNSON TO RUN THE SAME NUMBER THROUGH THE SAME EQUATIONS THAT HAD BEEN PROGRAMMED INTO THE COMPUTER BUT BY HAND ON HER DESKTOP MECHANICAL CALCULATING MACHINE. IF SHE SAYS THEY'RE GOOD. KATHERINE JOHNSON REMEMBERSTHE ASTRONAUTS SAYING THEN I'M READY TO GO. GLENN'S FLIGHT WAS A SUCCESS AND MARKED A TURNING POINT IN THE COMPETITION BETWEEN THE UNITED STATES AND THE SOVIET UNION IN SPACE. WHEN ASKED TO NAME HER GREATEST CONTRIBUTION TO SPACE EXPLORATION JOHNSON WOULD TALK ABOUT THE CALCULATIONS THAT HELPED SYNCHRONIZE PROJECT APOLLO'S LUNAR MODULE WITH THE LUNAR ORBITING COMMAND AND SERVICE MODULE. SHE ALSO WORKED ON THE SPACE SHUTTLE AND THE EARTH RESOURCE TECHNOLOGY SATELLITE. ERTS LATER RENAMED LANDSAT AND A CO-AUTHOR OF A RESEARCH REPORT. SHE RETIRED IN 1971 AFTER YEARS AT LANGLEY. LOVED GOING TO WORK EVERY SINGLE DAY. SHE SAID IN A 2014 AGE JOHNSON ADDED ANOTHER EXTRAORDINARY ACHIEVEMENT TO HER LONG LIST. PRESIDENT BARACK OBAMA AWARDED HER THE PRESIDENTIAL MEDAL OF FREEDOM AMERICA'S HIGHEST CIVILIAN HONOR. SHE DIED ON FEBRUARY 24, 2020. NASA ADMINISTRATOR JAMES BRIDENSTINE SAID OUR NASA FAMILY IS SAD TO LEARN THE NEWS THAT KATHERINE JOHNSON PASSED AWAY THIS MORNING. AT 91 YEARS OLD SHE WAS AN AMERICAN HERO AND HER PIONEERING LEGACY WILL NEVER BE FORGOTTEN.

## Part B

--- Use letter frequency analysis to make educated guesses about the shift amount

Replit Link: <https://replit.com/@mecpsTealsJava/Frequency-Analysis#main.py>

### Results of the frequency analysis:

V has the highest frequency.

Guess: E -> V

hence a key = 17

{'A': 22, 'B': 44, 'C': 167, 'D': 102, 'E': 324, 'F': 327, 'G': 86, 'H': 6, 'I': 284, 'J': 283, 'K': 389, 'L': 106, 'M': 43, 'N': 70, 'O': 4, 'P': 55, 'Q': 2, 'R': 378, 'S': 64, 'T': 145, 'U': 164, 'V': 510, 'W': 89, 'X': 107, 'Y': 256, 'Z': 308}

Question #2: Encoding a message.

Create a program or design an algorithm to take a string and encode it using your method.

Replit Link: <https://replit.com/@mecpsTealsJava/SubstitutionEncryptionYearwood#main.py>

### Sample input and output:

message = To the man with a hammer everything is a nail

encoded message = \$4e20.e%,xeB/20e,e0,%%.+e.1.+U20/xFe/te,ex,/3