Computer Security-Assignment 1

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Text

Description automatically generated

1.a. **Individual letters**

Chart, bar chart, histogram

Description automatically generated

**Bigrams**

43 combinations (bigram)

Chart, histogram

Description automatically generated

276 combinations (bigram)

Chart, bar chart, histogram

Description automatically generated

**Trigrams**

26 combinations (trigram)

Chart, histogram

Description automatically generated

768 combinations (trigram)

Chart

Description automatically generated

**1.b. Frequencies**

## Individual letters

|  |  |
| --- | --- |
| N | 44 |
| B | 21 |
| U | 36 |
| Z | 110 |
| G | 124 |
| S | 89 |
| V | 185 |
| I | 72 |
| D | 32 |
| R | 84 |
| H | 78 |
| M | 100 |
| W | 58 |
| T | 25 |
| E | 16 |
| L | 89 |
| F | 33 |
| C | 6 |
| X | 23 |
| O | 41 |
| Y | 21 |
| K | 31 |
| Q | 2 |
| P | 6 |
| A | 1 |
| J | 2 |
|  |  |

## Bigrams

|  |  |
| --- | --- |
|  |  |
| NB | 4 |
| BU | 2 |
| UZ | 7 |
| ZG | 23 |
| GS | 50 |
| SV | 44 |
| VI | 25 |
| IZ | 9 |
| ZD | 2 |
| DR | 6 |
| RH | 15 |
| HV | 15 |
| VZ | 13 |
| ZM | 26 |
| MW | 22 |
| WT | 2 |
| TI | 3 |
| ZE | 6 |
| EV | 11 |
| VN | 15 |
| NZ | 6 |
| MT | 15 |
| TZ | 3 |
| NV | 14 |
| VH | 19 |
| IR | 11 |
| RL | 6 |
| LF | 9 |
| FH | 4 |
| HZ | 5 |
| WV | 8 |
| VC | 5 |
| CX | 1 |
| XV | 5 |
| VO | 8 |
| OO | 6 |
| OV | 10 |
| VM | 15 |
| MG | 15 |
| GX | 1 |
| XL | 5 |
| FM | 7 |
| MH | 4 |
| OZ | 5 |
| ZT | 1 |
| ZR | 2 |
| RM | 27 |
| HG | 19 |
| GD | 4 |
| DS | 9 |
| SZ | 23 |
| VU | 3 |
| UL | 6 |
| LI | 15 |
| IV | 14 |
| DD | 1 |
| DZ | 8 |
| ZH | 13 |
| HN | 2 |
| BW | 1 |
| HR | 3 |
| RT | 4 |
| TM | 1 |
| MS | 3 |
| VX | 8 |
| XZ | 3 |
| ZO | 5 |
| VW | 14 |
| WN | 6 |
| VL | 11 |
| LM | 17 |
| MV | 11 |
| NL | 6 |
| IM | 2 |
| MR | 3 |
| TR | 2 |
| GL | 15 |
| LS | 3 |
| SR | 13 |
| HX | 2 |
| XS | 5 |
| ZN | 5 |
| NY | 3 |
| YV | 8 |
| ID | 3 |
| VS | 6 |
| VD | 10 |
| MU | 1 |
| UR | 1 |
| WY | 3 |
| YB | 5 |
| BG | 3 |
| VT | 2 |
| TL | 1 |
| FG | 2 |
| GZ | 9 |
| CK | 3 |
| KL | 5 |
| LH | 4 |
| GF | 6 |
| FO | 1 |
| GV | 12 |
| WE | 2 |
| IB | 4 |
| BD | 5 |
| ZI | 8 |
| IN | 1 |
| NO | 1 |
| OB | 2 |
| RG | 9 |
| SN | 1 |
| VF | 3 |
| FK | 5 |
| HH | 5 |
| HF | 5 |
| FY | 1 |
| YQ | 1 |
| QV | 1 |
| XG | 2 |
| HP | 1 |
| PV | 2 |
| GI | 5 |
| HL | 7 |
| HO | 1 |
| OM | 1 |
| ME | 3 |
| EW | 1 |
| WO | 3 |
| ON | 1 |
| VG | 9 |
| MZ | 8 |
| MX | 3 |
| XO | 1 |
| OR | 7 |
| GR | 6 |
| RS | 1 |
| ZW | 7 |
| WU | 2 |
| IO | 2 |
| ER | 3 |
| TU | 1 |
| IH | 2 |
| HS | 4 |
| SL | 2 |
| BM | 2 |
| RE | 1 |
| VR | 7 |
| RN | 3 |
| NR | 8 |
| TS | 3 |
| SG | 4 |
| GY | 2 |
| DV | 4 |
| IL | 5 |
| LW | 1 |
| WF | 3 |
| FX | 1 |
| WZ | 4 |
| WS | 3 |
| ZK | 4 |
| KI | 4 |
| HK | 3 |
| KV | 7 |
| LU | 19 |
| UI | 2 |
| TN | 1 |
| IG | 9 |
| VY | 4 |
| BZ | 2 |
| KK | 5 |
| KO | 4 |
| RX | 6 |
| WR | 2 |
| RU | 3 |
| UV | 6 |
| WK | 1 |
| FI | 5 |
| LO | 2 |
| OW | 3 |
| ML | 6 |
| UW | 1 |
| WL | 2 |
| KR | 3 |
| RI | 1 |
| TH | 6 |
| IU | 1 |
| LG | 6 |
| LD | 3 |
| ZY | 4 |
| YI | 1 |
| LZ | 2 |
| BV | 2 |
| IK | 4 |
| ZP | 2 |
| NH | 1 |
| OE | 1 |
| HU | 1 |
| MF | 1 |
| PR | 4 |
| UG | 6 |
| LN | 1 |
| NN | 1 |
| MI | 1 |
| WG | 10 |
| GG | 5 |
| HD | 2 |
| LL | 2 |
| YL | 3 |
| LE | 2 |
| IY | 1 |
| OL | 4 |
| DN | 1 |
| GN | 2 |
| RW | 3 |
| WW | 2 |
| UO | 2 |
| DO | 1 |
| SS | 1 |
| BO | 2 |
| TV | 2 |
| RV | 3 |
| GH | 2 |
| DL | 2 |
| FR | 1 |
| SF | 1 |
| FN | 1 |
| HM | 1 |
| IW | 2 |
| WH | 2 |
| RK | 1 |
| KH | 1 |
| FU | 1 |
| UU | 2 |
| XK | 1 |
| KZ | 2 |
| UN | 2 |
| MP | 2 |
| WM | 1 |
| YZ | 1 |
| II | 2 |
| WD | 2 |
| VK | 2 |
| OF | 1 |
| FC | 1 |
| CF | 1 |
| YR | 1 |
| EB | 1 |
| BL | 1 |
| GQ | 1 |
| QF | 1 |
| FW | 1 |
| TE | 1 |
| RA | 1 |
| AG | 1 |
| LK | 1 |
| VV | 3 |
| GP | 1 |
| VJ | 2 |
| JF | 2 |
| FV | 2 |
| GO | 1 |
| YO | 1 |
| UY | 1 |
| TY | 1 |
| LT | 1 |
| VB | 1 |
| BS | 1 |
| MK | 1 |
| ZX | 1 |
| LV | 1 |
| CG | 1 |
| HY | 1 |
| MB | 1 |
| XR | 1 |
| GB | 2 |
| ZB | 1 |

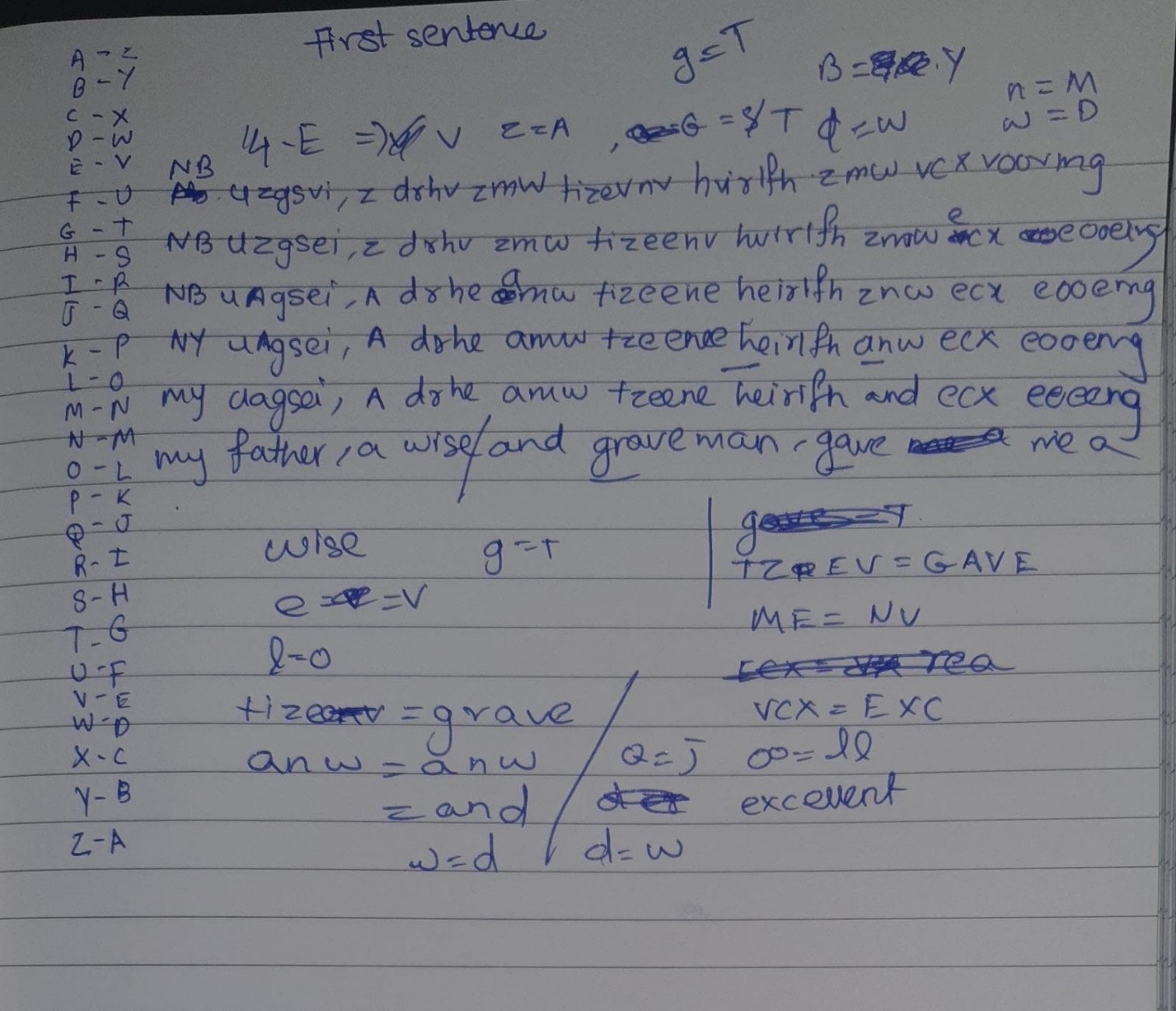
## Trigrams

|  |  |
| --- | --- |
| NBU | 2 |
| BUZ | 1 |
| UZG | 2 |
| ZGS | 3 |
| GSV | 33 |
| SVI | 8 |
| VIZ | 3 |
| IZD | 1 |
| ZDR | 1 |
| DRH | 3 |
| RHV | 6 |
| HVZ | 4 |
| VZM | 5 |
| ZMW | 17 |
| MWT | 1 |
| WTI | 1 |
| TIZ | 1 |
| IZE | 1 |
| ZEV | 5 |
| EVN | 3 |
| VNZ | 2 |
| NZM | 5 |
| ZMT | 2 |
| MTZ | 2 |
| TZE | 2 |
| VNV | 5 |
| NVH | 2 |
| VHV | 2 |
| HVI | 3 |
| VIR | 6 |
| IRL | 2 |
| RLF | 1 |
| LFH | 3 |
| FHZ | 1 |
| HZM | 3 |
| MWV | 5 |
| WVC | 2 |
| VCX | 1 |
| CXV | 1 |
| XVO | 1 |
| VOO | 2 |
| OOV | 4 |
| OVM | 1 |
| VMG | 7 |
| MGX | 1 |
| GXL | 1 |
| XLF | 2 |
| LFM | 3 |
| FMH | 1 |
| MHV | 2 |
| HVO | 2 |
| VOZ | 2 |
| OZT | 1 |
| ZTZ | 1 |
| TZR | 1 |
| ZRM | 1 |
| RMH | 1 |
| MHG | 1 |
| HGD | 1 |
| GDS | 1 |
| DSZ | 3 |
| SZG | 8 |
| SVU | 1 |
| VUL | 2 |
| ULI | 5 |
| LIV | 2 |
| IVH | 2 |
| VHZ | 2 |
| HZD | 1 |
| ZDD | 1 |
| DDZ | 1 |
| DZH | 6 |
| ZHN | 2 |
| HNB | 1 |
| NBW | 1 |
| BWV | 1 |
| WVH | 2 |
| VHR | 1 |
| HRT | 1 |
| RTM | 1 |
| TMS | 1 |
| MSV | 2 |
| SVX | 2 |
| VXZ | 2 |
| XZO | 2 |
| ZOO | 4 |
| OVW | 2 |
| VWN | 2 |
| WNV | 4 |
| NVL | 2 |
| VLM | 1 |
| LMV | 3 |
| MVN | 1 |
| VNL | 2 |
| NLI | 2 |
| LIM | 2 |
| IMR | 1 |
| MRM | 1 |
| RMT | 12 |
| MTR | 2 |
| TRM | 2 |
| RMG | 4 |
| MGL | 2 |
| GLS | 3 |
| LSR | 1 |
| SRH | 7 |
| RHX | 1 |
| HXS | 1 |
| XSZ | 3 |
| SZN | 1 |
| ZNY | 2 |
| NYV | 1 |
| YVI | 1 |
| VID | 2 |
| IDS | 3 |
| DSV | 3 |
| VIV | 4 |
| IVS | 2 |
| VSV | 2 |
| SVD | 3 |
| VDZ | 4 |
| ZHX | 1 |
| HXL | 1 |
| XLM | 2 |
| LMU | 1 |
| MUR | 1 |
| URM | 1 |
| RMV | 4 |
| MVW | 1 |
| VWY | 1 |
| WYB | 2 |
| YBG | 2 |
| BGS | 2 |
| SVT | 2 |
| VTL | 1 |
| TLF | 1 |
| LFG | 2 |
| FGZ | 1 |
| GZM | 2 |
| VCK | 3 |
| CKL | 2 |
| KLH | 2 |
| LHG | 2 |
| HGF | 1 |
| GFO | 1 |
| FOZ | 1 |
| OZG | 1 |
| ZGV | 6 |
| GVW | 3 |
| VWE | 1 |
| WEV | 2 |
| EVI | 2 |
| VIB | 1 |
| IBD | 3 |
| BDZ | 1 |
| DZI | 1 |
| ZIN | 1 |
| INO | 1 |
| NOB | 1 |
| OBD | 1 |
| BDR | 2 |
| DRG | 3 |
| RGS | 5 |
| GSN | 1 |
| SNV | 1 |
| NVF | 1 |
| VFK | 3 |
| FKL | 2 |
| KLM | 2 |
| LMG | 2 |
| MGS | 5 |
| GSR | 8 |
| RHH | 2 |
| HHF | 1 |
| HFY | 1 |
| FYQ | 1 |
| YQV | 1 |
| QVX | 1 |
| VXG | 2 |
| XGS | 1 |
| SVZ | 1 |
| VZH | 4 |
| ZHP | 1 |
| HPV | 1 |
| PVW | 1 |
| NVD | 1 |
| VDS | 3 |
| ZGI | 1 |
| GIV | 2 |
| IVZ | 4 |
| ZHL | 1 |
| HLM | 4 |
| LMH | 2 |
| MHO | 1 |
| HOM | 1 |
| OME | 1 |
| MEW | 1 |
| EWO | 1 |
| WON | 1 |
| ONL | 1 |
| IVG | 1 |
| VGS | 5 |
| GSZ | 7 |
| SZM | 3 |
| ZMZ | 3 |
| MZN | 1 |
| ZNV | 2 |
| NVI | 1 |
| IVD | 1 |
| DZM | 1 |
| WVI | 2 |
| IRM | 3 |
| RMX | 1 |
| MXO | 1 |
| XOR | 1 |
| ORM | 2 |
| RMZ | 1 |
| MZG | 3 |
| ZGR | 4 |
| GRL | 4 |
| RLM | 4 |
| LMR | 1 |
| MRS | 1 |
| RSZ | 1 |
| SZW | 4 |
| ZWU | 2 |
| WUL | 2 |
| LIO | 2 |
| IOV | 1 |
| OVZ | 2 |
| VZE | 1 |
| ZER | 1 |
| ERM | 1 |
| MTU | 1 |
| TUZ | 1 |
| VIH | 2 |
| IHS | 1 |
| HSL | 1 |
| SLF | 1 |
| FHV | 1 |
| MWN | 2 |
| WNB | 1 |
| NBM | 1 |
| BMZ | 1 |
| GRE | 1 |
| REV | 1 |
| EVX | 1 |
| VXL | 3 |
| FMG | 1 |
| MGI | 2 |
| GIB | 2 |
| BDS | 2 |
| IVR | 1 |
| VRN | 2 |
| RNR | 2 |
| NRT | 3 |
| RTS | 3 |
| TSG | 3 |
| SGY | 2 |
| GYV | 2 |
| YVD | 1 |
| VDV | 1 |
| DVO | 1 |
| OOR | 1 |
| GIL | 1 |
| ILW | 1 |
| LWF | 1 |
| WFX | 1 |
| FXV | 1 |
| XVW | 2 |
| VWZ | 1 |
| WZM | 2 |
| MWS | 3 |
| WSZ | 2 |
| ZWZ | 1 |
| WZK | 1 |
| ZKI | 1 |
| KIL | 1 |
| ILH | 1 |
| LHK | 1 |
| HKV | 2 |
| KVX | 1 |
| XGL | 1 |
| GLU | 4 |
| LUI | 1 |
| UIZ | 1 |
| IZR | 1 |
| ZRH | 1 |
| RHR | 1 |
| HRM | 2 |
| MTN | 1 |
| TNB | 1 |
| BUL | 1 |
| LIG | 4 |
| IGF | 3 |
| GFM | 3 |
| FMV | 3 |
| MVY | 1 |
| VYB | 3 |
| YBZ | 1 |
| BZK | 1 |
| ZKK | 3 |
| KKO | 1 |
| KOR | 1 |
| ORX | 2 |
| RXZ | 1 |
| XZG | 1 |
| LMZ | 3 |
| MZM | 3 |
| MWR | 1 |
| WRM | 2 |
| RMW | 3 |
| MWF | 1 |
| WFH | 1 |
| FHG | 1 |
| HGI | 1 |
| SZO | 2 |
| ZOR | 1 |
| ORU | 3 |
| RUV | 3 |
| UVL | 1 |
| VLU | 5 |
| LUV | 1 |
| UVZ | 1 |
| ZHV | 1 |
| MWK | 1 |
| WKO | 1 |
| KOV | 2 |
| ZHF | 1 |
| HFI | 1 |
| FIV | 3 |
| SVG | 3 |
| VGL | 2 |
| GLO | 2 |
| LOW | 2 |
| OWN | 2 |
| NVR | 2 |
| VRG | 3 |
| RGD | 1 |
| GDZ | 1 |
| HNV | 1 |
| NVM | 2 |
| VML | 1 |
| MLU | 2 |
| LUW | 1 |
| UWV | 1 |
| VHK | 1 |
| KVI | 5 |
| IZG | 1 |
| GVU | 1 |
| MVH | 4 |
| VHL | 2 |
| LML | 2 |
| MLM | 1 |
| MVS | 1 |
| VSZ | 3 |
| MWL | 1 |
| WLI | 1 |
| LIL | 1 |
| ILU | 1 |
| LUZ | 4 |
| UZH | 1 |
| ZHK | 1 |
| HKR | 1 |
| KRI | 1 |
| RIR | 1 |
| MTH | 6 |
| THF | 1 |
| HFK | 1 |
| FKV | 1 |
| RLI | 1 |
| LIU | 1 |
| IUL | 1 |
| SVL | 1 |
| VLG | 1 |
| LGS | 4 |
| DSL | 1 |
| SLD | 1 |
| LDV | 1 |
| DVM | 1 |
| MGZ | 1 |
| GZY | 1 |
| ZYI | 1 |
| YIL | 1 |
| ILZ | 2 |
| LZW | 2 |
| ZWF | 1 |
| WFK | 1 |
| MZW | 1 |
| ZWE | 1 |
| EVM | 2 |
| MGF | 1 |
| GFI | 2 |
| VHG | 6 |
| HGL | 1 |
| GLI | 1 |
| LIR | 1 |
| IRH | 2 |
| HVY | 1 |
| YBV | 1 |
| BVM | 1 |
| MGV | 2 |
| GVI | 1 |
| VIK | 4 |
| IKI | 1 |
| KIR | 2 |
| WNZ | 1 |
| NZP | 1 |
| ZPV | 1 |
| PVG | 1 |
| SVN | 8 |
| VNH | 1 |
| NHV | 1 |
| VOE | 1 |
| OEV | 1 |
| EVH | 1 |
| VHU | 1 |
| HUZ | 1 |
| UZN | 1 |
| ZNL | 1 |
| NLF | 1 |
| FHR | 1 |
| RMF | 1 |
| MFM | 1 |
| FMW | 2 |
| VIG | 3 |
| IGZ | 1 |
| GZP | 1 |
| ZPR | 1 |
| PRM | 4 |
| THL | 2 |
| HLU | 3 |
| UZM | 1 |
| ZGF | 1 |
| IVL | 1 |
| VLF | 1 |
| FGL | 1 |
| LUG | 6 |
| UGS | 6 |
| XLN | 1 |
| LNN | 1 |
| NNL | 1 |
| NLM | 2 |
| LMI | 1 |
| MIL | 1 |
| ZWG | 1 |
| WGS | 7 |
| ZGG | 5 |
| GGS | 5 |
| SVH | 4 |
| HVG | 1 |
| SRM | 3 |
| THD | 1 |
| HDV | 1 |
| DVI | 1 |
| VZO | 1 |
| OVR | 1 |
| IGL | 4 |
| GLL | 2 |
| LLU | 2 |
| UZI | 2 |
| ZIZ | 1 |
| IZY | 2 |
| ZYL | 2 |
| YLE | 1 |
| LEV | 2 |
| VLI | 2 |
| ZIY | 1 |
| IYV | 1 |
| YVO | 1 |
| VOL | 1 |
| OLD | 2 |
| LDN | 1 |
| DNV | 1 |
| NVG | 1 |
| ZGN | 2 |
| GNR | 2 |
| NRM | 1 |
| MVD | 1 |
| ZHG | 4 |
| HGS | 5 |
| VNR | 4 |
| NRW | 2 |
| RWW | 2 |
| WWO | 2 |
| WOV | 2 |
| OVH | 1 |
| HGZ | 6 |
| GZG | 5 |
| GVL | 2 |
| LID | 1 |
| YVX | 1 |
| VWG | 7 |
| SVF | 2 |
| FKK | 2 |
| KKV | 2 |
| IHG | 1 |
| LUO | 2 |
| UOL | 1 |
| LDO | 1 |
| DOR | 1 |
| UVD | 2 |
| DSR | 2 |
| SRX | 2 |
| RXS | 3 |
| XSS | 1 |
| SSV | 1 |
| SVS | 2 |
| ULF | 1 |
| MWY | 1 |
| YBO | 1 |
| BOL | 1 |
| OLM | 1 |
| LMT | 1 |
| MTV | 1 |
| TVC | 1 |
| CKV | 1 |
| IRV | 2 |
| RVM | 1 |
| VMX | 2 |
| MXV | 2 |
| XVD | 1 |
| SVY | 1 |
| VYV | 1 |
| YVH | 1 |
| HGH | 2 |
| GHG | 1 |
| GVR | 1 |
| VRM | 2 |
| VDL | 1 |
| DLI | 1 |
| IOW | 1 |
| OWG | 1 |
| NLH | 1 |
| GHF | 1 |
| HFR | 1 |
| FRG | 1 |
| RGV | 1 |
| WGL | 3 |
| LSF | 1 |
| SFN | 1 |
| FNZ | 1 |
| ZMS | 1 |
| MSZ | 1 |
| SZK | 2 |
| KKR | 2 |
| KRM | 2 |
| VHH | 2 |
| HHM | 1 |
| HML | 1 |
| MLG | 2 |
| LGV | 2 |
| GVC | 1 |
| LHV | 1 |
| HVW | 2 |
| GLG | 2 |
| NRH | 2 |
| RVH | 1 |
| SZI | 1 |
| ZIW | 2 |
| IWH | 1 |
| WHS | 1 |
| HSR | 1 |
| SRK | 1 |
| RKH | 1 |
| KHG | 1 |
| SVO | 1 |
| OZY | 1 |
| YLF | 1 |
| LFI | 1 |
| FIZ | 1 |
| IZM | 1 |
| MWH | 1 |
| WHF | 1 |
| HFU | 1 |
| FUU | 1 |
| UUV | 2 |
| UVI | 1 |
| NVX | 1 |
| VXS | 1 |
| ZMR | 1 |
| MRX | 1 |
| RXK | 1 |
| XKZ | 1 |
| KZI | 2 |
| ZIG | 2 |
| LUN | 2 |
| UNZ | 2 |
| ZMP | 2 |
| MPR | 2 |
| MWZ | 2 |
| MWM | 1 |
| WML | 1 |
| GVN | 1 |
| VNY | 1 |
| NYZ | 1 |
| YZI | 1 |
| ZII | 1 |
| IIZ | 1 |
| IZH | 1 |
| ZHH | 1 |
| HHV | 1 |
| VWD | 1 |
| WDR | 2 |
| GSG | 1 |
| SGS | 1 |
| SVK | 2 |
| VKI | 2 |
| IRW | 1 |
| RWV | 1 |
| WVO | 1 |
| VOF | 1 |
| OFC | 1 |
| FCF | 1 |
| CFI | 1 |
| FIB | 1 |
| IBZ | 1 |
| BZN | 1 |
| NYR | 1 |
| YRG | 1 |
| RGR | 1 |
| WVM | 1 |
| VME | 2 |
| MEB | 1 |
| EBL | 1 |
| BLU | 1 |
| IKZ | 1 |
| WSV | 1 |
| SGQ | 1 |
| GQF | 1 |
| QFW | 1 |
| FWT | 1 |
| WTV | 1 |
| TVL | 1 |
| HHL | 1 |
| HHG | 1 |
| GVY | 1 |
| RHL | 1 |
| MVG | 1 |
| MTE | 1 |
| TER | 1 |
| ERA | 1 |
| RAG | 1 |
| AGS | 1 |
| RHD | 1 |
| HDZ | 1 |
| UOR | 1 |
| OOL | 1 |
| OLG | 1 |
| IKV | 1 |
| KVL | 1 |
| VLK | 1 |
| LKO | 1 |
| OVV | 1 |
| VVM | 3 |
| MER | 1 |
| ERV | 1 |
| RVW | 1 |
| ZGP | 1 |
| GPR | 1 |
| THS | 1 |
| HSZ | 1 |
| SZE | 2 |
| EVU | 1 |
| VUI | 1 |
| UIV | 1 |
| IVJ | 1 |
| VJF | 2 |
| JFV | 2 |
| FVM | 2 |
| MGO | 1 |
| GOB | 1 |
| OBO | 1 |
| BOZ | 1 |
| OZN | 1 |
| ZYO | 1 |
| YOV | 1 |
| OVX | 1 |
| HVJ | 1 |
| XVL | 1 |
| LUY | 1 |
| UYV | 1 |
| YVR | 1 |
| MTY | 1 |
| TYL | 1 |
| YLI | 1 |
| IMG | 1 |
| GLT | 1 |
| LTI | 1 |
| TIV | 2 |
| VZG | 2 |
| THZ | 1 |
| MWD | 1 |
| RHS | 1 |
| HSV | 1 |
| SVW | 1 |
| SVB | 1 |
| VBS | 1 |
| BSZ | 1 |
| ZWY | 1 |
| WYV | 1 |
| YVV | 1 |
| VMK | 1 |
| MKO | 1 |
| KOZ | 1 |
| OZX | 1 |
| ZXV | 1 |
| VWR | 1 |
| OVL | 1 |
| VGD | 2 |
| GDL | 1 |
| DLV | 1 |
| LVC | 1 |
| VCG | 1 |
| CGI | 1 |
| IVN | 1 |
| VHY | 1 |
| HYV | 1 |
| YVG | 1 |
| GDV | 1 |
| DVV | 1 |
| NVZ | 1 |
| MWG | 1 |
| VTI | 1 |
| VDR | 1 |
| HVN | 1 |
| EVS | 1 |
| VSR | 1 |
| RHG | 1 |
| HGV | 1 |
| GVH | 1 |
| HGR | 1 |
| GRN | 1 |
| RNL | 1 |
| LMB | 1 |
| MBG | 1 |
| BGL | 1 |
| RHZ | 1 |
| HZH | 1 |
| WZI | 1 |
| IWL | 1 |
| WLU | 1 |
| LUU | 1 |
| UVO | 1 |
| VOR | 1 |
| RXR | 1 |
| XRG | 1 |
| RGB | 1 |
| GBD | 1 |
| SVM | 1 |
| VMS | 1 |
| KIZ | 1 |
| IZB | 1 |
| ZBV | 1 |
| BVW | 1 |
| LSZ | 1 |
| VMV | 1 |
| MVR | 1 |
| IKL | 1 |
| KLE | 1 |
| IGB | 1 |
| GBM | 1 |
| BML | 1 |
| MLI | 1 |
| LII | 1 |
| IIR | 1 |
| IRX | 1 |
| XSV | 1 |

## 1c

Text

Description automatically generated



Using substitution,

my father, a wise and grave man, gave me serious and excellent counsel against what he foresaw was my design. he called me one morning into his chamber, where he was confined by the gout, and expostulated very warmly with me upon this subject. he asked me what reasons(error:lnvdl), more than a mere wandering inclination, I had for leaving father's house and my native country, where I might be well introduced, and had a prospect of raising my fortune by application and industry, with a life of ease and pleasure. he told me it was men of desperate fortunes on one hand, or of aspiring, superior fortunes on the other, who went abroad upon adventures, to rise by enterprise, and make themselves famous in undertakings of a nature out of the common road; that these things were all either too far above me or too far below me; that mine was the middle state, or what might be called the upper station of low life, which he had found, by long experience, was the best state in the world, the most suited to human happiness, not exposed to the miseries and hardships, the labour and sufferings of the mechanic part of mankind, and not embarrassed with the pride, luxury, ambition, and envy of the upper part of mankind. he told me I might judge of the happiness of this state by this one thing - viz. that this was the state of life which all other people envied; that kings have frequently lamented the miserable consequence of being born to great things, and wished they had been placed in the middle of the two extremes, between the mean and the great; that the wise man gave his testimony to this, as the standard of felicity, when he prayed to have neither poverty nor riches

## Task 2

Graphical user interface, text

Description automatically generated

**Plain Text**: Hi, I am Talha Abdullah. I am a 3rd year student studying in Qatar University. I am majoring in Computer Science and have a great interest in the field of cyber. I aspire to work highly in the field of cyber and artificial intelligence. We are studying this semester a subject course called computer security which is related to my field. Although my interest is more into coding and willing to work hard for it. I have worked on different languages such as Java, JavaScript, C, and C++. I have worked on different subjects such as reservation systems, web designing, operating system related programming and data communication. I do not watch movies or serials. I played outdoor sports such as football and cricket, and indoor sports such as billiards and table tennis.

**KEY: FDE8F7A9B86C3BFF07C0D39D04605EDD**

**HexaDecimal AES (Using

**AES analysis**

**16 bits**

Text

Description automatically generated

Graphical user interface, text, application

Description automatically generated

**24 bits**

Graphical user interface, text

Description automatically generated

Graphical user interface, application, Word

Description automatically generated

**BONUS: Client connection issues/ could not (did try to anonymously connect and work on a different design of code set by a random user)**

Graphical user interface, application, Word

Description automatically generated

## Task 3

Graphical user interface, text, application, email

Description automatically generated

1. **One-Round Attack**

One-round attack on DES shows the typology of the attack. These attacks ignore the initial and final permutation as well as the final left-right swap. Since the permutation table is known to the attacker, hence the security of the computer is not enhanced enough. The computer can be used to track off the everything to hinder these attacks. Intersecting the final output of the first round and also trying multiple possibilities and passing it through the Function and then the S box to determine the possible values or the message block to be found. Thus, This attack can be time consuming but can also lead to a threat for the sender of the message.

1. **Full 16 Rounds Attack**

The full 16 rounds attack can break the full 16 round DES algorithm in under 255 complexities of exhaustive search. Thus, cryptanalysis computes key 236 ciphertexts within 237 times. These are derived from a wider pool of 247 plaintexts using a single bit repetition criteria method that eliminates 99.9% of ciphertexts. This technique uses very little memory and can count to 233 unconnected processors in parallel with linear speedup. Due to frequent key changes during the data gathering process, the analyzed ciphertexts are obtained from up to 233 distinct keys. The attack can be carried out gradually with any number of available ciphertexts, with the likelihood of success increasing linearly as the number of available ciphertexts increases.

1. **Meet-in-the-middle Attack**

A Meet-in-the-Middle Attack is a type of cryptanalytic attack in which the attacker aids the attack by using a space or time tradeoff. The goal of this is to drastically reduce the amount of time and effort required to undertake a brute-force attack. Meet-in-the-middle attack aims to lessen the amount of difficulty required to carry out the assault in its original form. Meet-in-the-middle attack can be as simple as separating the target message into two pieces and addressing each one separately. It could imply converting an attack that takes X amount of time into one that takes Y time and Z space.

1. **Time-Memory Tradeoff (TMTO) Attack**

A time-memory tradeoff (TMTO) attack is a sort of cryptographic assault in which an attacker attempts to create a situation like the space–time tradeoff, but with the inclusion of the data parameter, which represents the quantity of data available to the attacker. This attack has two phases:

1. **Preprocessing:** During this phase, the attacker investigates the cryptosystem's structure and is given permission to record their results in big tables. It may take a long time to complete this task.
2. **Realtime:** The cryptanalyst is given real data collected from a specific unknown key in this phase. They then try to discover the specific key as quickly as possible by combining this information with the precomputed table from the preprocessing phase.