Program Studi Informatika
Sekolah Teknik Elektro dan Informatika
Institut Teknologi Bandung

Tugas Kecil I (Tucil I) IF4020 Kriptografi Sem. I Tahun 2025/2026

Kriptanalisis Sederhana pada Algoritma Kriptografi Klasik

Batas pengumpulan	:	Selasa, 16 September 2025
Tempat pengumpulan	:	Form Pengumpulan
Anggota kelompok	:	2 orang
QnA		Sheet QnA

Berkas pengumpulan:
Laporan (*soft copy*) dengan format PDF sederhana yang berisi

a. Berkas cipherteks
b. Langkah-langkah yang Anda lakukan dalam melakukan dekripsi
c. Kunci yang diperoleh (jika *applicable*)
d. Plainteks hasil dekripsi (jika mungkin, diformat kembali dengan format asli)

Kumpulkan dengan format **NIM1_NIM2_Tucil1_IF4020.pdf**

Informasi Tambahan:
Pada proses pembuatan cipherteks, plainteks diubah seluruhnya menjadi kapital. Lalu, enkripsi hanya dilakukan pada karakter abjad (A..Z). Karakter lain (angka, spasi, koma, titik, dan lain-lain) dibuang (tidak dienkripsi).

I. Legenda Kelahiran Nebula

Demi penelitiannya tentang sebuah nebula, Erik Velsig mengunjungi salah satu perpustakaan terbesar di dunia. Setelah mencari puluhan tumpukan buku berdebu, Erik menemukan sebuah buku dengan judul yang menarik perhatian: “Legenda Kelahiran Nebula”. Erik yakin buku ini membahas nebula yang sedang ditelitinya. Namun, ternyata seseorang telah menyamarkan isi buku tersebut. Erik menduga bahwa enkripsi dilakukan menggunakan ***cipher* substitusi abjad-tunggal (*monoalphabetic cipher*)**, dan bahasa aslinya adalah **bahasa Inggris**.

Bantulah Erik memecahkan cipherteks berikut. Gunakan analisis frekuensi huruf, bigram, dan trigram dalam bahasa Inggris untuk mengungkap pesan tersembunyi di dalamnya. Gunakan juga kemungkinan kata-kata umum dalam teks jika dibutuhkan.

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CGVDVXUATQAGAIGATQGAAFIRHTVHUGOPOAPJIGUPJAMFVGDMTQAGAIGATQGAAFIRHTV
HUGOPOAPJIGUPJAMFVGDMJVFPQIOAKVGXVTTAJIKAFZUTVJATQPJXPHYAGTIPJTQAKI
YTTQITRVUFQVIGAGAIMPJXTQPHJVFFPDDHUGOPOATQGAAFIRHTVHUGOPOAPJIGUPJAM
FVGDMIFAZJVOADCDITKVGNKPDDAMTQAHYGAAJVKNRVDMHNIGTCQVJAPHYGVDDAMMVFJ
IJMTQAJUCIXIPJQVFNIJRTPNAHQIOAPZAAJMVPJXTQPHGAIDDRTQPHPHTQAAJMPDVVL
AMIXIPJIJMTQAYVNCDATAFIHUJNPHTILIZDATQAHTVGRFIHVOAGTQGAAFIRHTVHUGOP
OAPJIGUPJAMFVGDMIUTQVGTDHYQICTAGHTQGAAFIRHTVHUGOPOAPJIGUPJAMFVGDMFI
HIKAITUGADAJXTQKIJTIHRJVOADFPTQYQICTAGHPTHHQVGTAJAMJINAFIHFIRHVKHUG
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OPOIDPQIOAZAAJHTAIMPDRGAIMPJXTQPHJVOADHPJYATQATQPGMRAIGVKNPMMDAHYQV
VDMUGPJXTQATPNAFQAJPFIHZUDDPAMZRPDEPJHFQAJPGUPJAMNRAJTGIJYAABINPJIT
PVJHIJMQIMTVAJTAGIDVYIDUJPOAGHPTRFQAJTQAMINJAMGIJMVNMGIFFAJTFGVJXIJ
MPFIHCDIYAMPJTQANPDPTIGRUJPTITTQAKVGAKGVJTFQAJPGACAITAMDRHFPTYQAMEV
ZHIJMINJVFFVGLPJXIHIYVJTGIYTVGKVGIJIKKPDPITAVKIDIGXAYVNCIJRMINJDATH
HTVCTIDLPJXIZVUTTQPHIJRFIRIUTQVGHFVGMHTQIJLRVUHVNUYQKVGGAIMPJXFIRHV
KHUGOPOIDUCTVQAGAPFPDDYVNAZIYLTVRVUFPTQIJACPDVXUAIQTQAACPDVXUAHTPDD
GANIPJHTQAJTQAJABTYQICTAGPHGAIDDRTQADIHTVJAKGVNTQAAJMVKYQPDMQVVMTVI
MUDTQVVMPTQIMZAAJMVJAVOAGIQUXACAGPVMVKRAIGHTQAGAFIHINPBTUGAVKMAHCVJ
MAJYRTQITIFVGDMFIHYVNPJXTVIJAJMIDVJXFPTQIHAJHAVKHITPHKIYTPVJPVCAJAM
TQAYVNNAJTZVBVKTQADIHTNAHHIXAIJMGAFGVTATQAHAJTAJYAHAOAGIDTPNAHLPNMV
LEIFGPTAGTQIJLRVUKVGAOAGRTQPJXPJTQANAIJTPNAPINDVVLPJXKVGFIGMTVTQAAC
PDVXUATQARFAGAHPJYAGAHAJTAJYAHFIRHVKHUGOPOIDFIHNRDPKAHJVOADPTFIHJTT
QANVHTCVCUDIGZUTPTFIHTQAZAHTJVOADKVGNATQAGAFAGANIJRFVGMHPFIJTAMTVHI
RZUTPYVUDMJTFGPTATQANPFIHIKGIPMTQITNRYIGADAHHFVGMHFVUDMQUGTTQAFGPTA
GIJIOAGIXAVKQPTHCAGYQICTAGIJIOAGIXAVKYVNNAJTHTQPHFIHTQAIOAGIXACVCUD
IGPTRPJMABVKFIRHVKHUGOPOIDTQAJUNZAGVKOPAFHKVGTQAKPGHTYQICTAGFIHZUTP
TKADDTVKVGTQATQYQICTAGIJMTQAJKVGTQATQYQICTAGZRTQATPNAPTFIHTQATQYQIC
TAGPTFIHVJDRQPTHPFIHVOAGFQADNAMZRTQAKAADPJXPXVTFQAJPHIFTQAJUNAGVUHT
QITICCAIGAMJABTTVTQADPHTVKYQICTAGHPJHVNAYIHAHTQAGAFIHIZUTPTFIHDPLAD
RHVNAVJACGAHHPJXTQAFGVJXZUTTVJTQIJLRVUTQAIUTQVGCUZDPHQAMIJVOADFPTQN
VGATQIJYQICTAGHFPTQEUHTQPTCAGYQICTAGVOAGICAGPVMVKRAIGHPTFIHTGUDRIHT
VGREUHTKVGNAPCGAHHAMVJTQAGAYVNNAJMITPVJZVIGMIJMPNNAMPITADRHTIGTAMTI
CCPJXVJTQALARZVIGMPINGAYVNNAJMPJXIQVJAREINJVOADTQAIUTQVGFGVTANAIKGA
AYVNCDATAMJVOADHVPHQVUDMXPOAQPNIGAYVNNAJMITPVJPYDPYLAMVJTQAYVNCDATA
MZUTTVJIJMYVNNAJTHWUPYLDRICCAIGAMPTDVVLHDPLAIJAFIJTPPHAIGYQAMKVGTQP
HCAGHVJHPMIJMTQARGAYVNNAJMAMTQAHINAJVOADHAOAGIDTPNAHPHJTQPHGAYVNNAJ
MITPVJZIJJAMTQAIUTQVGHQVUDMJTMVTQPHQAGAPTVYYUGGAMTVNATQITPQIMFGPTTA
JIGAYVNNAJMITPVJHAOAGIDNVJTQHIXVPJIJPJHTIJTTQAGAFAGAMVSAJHVKYVNNAJT
HKVGPJOAHTPXITPVJZRHCAYTITVGHNRKIYAKDUHQAMFPTQANZIGGIHHNAJTPFIHHUGA
TQITTQAIUTQVGFVUDMGAIMTQPHHVPQUGGPAMDRTGPAMTVMADATATQANAHHIXAZUTPTF
IHIDGAIMRGACVGTAMTQITTQANAHHIXAYVUDMJTZAGANVOAMTQPHPTFIHUCHATTPJXTV
TQPJLTQITTQAGAYVNNAJMITPVJFGPTTAJFPTQIDDNRHPJYAGPTRTUGJAMVUTDPLATQP
HPKTQARAOAJDVVLAMIDPTTDAZPTFQRMPMJTIJRVJATGRGAIMPJXTQAPJTAGAHTPJXJV
OADPFIJTAMTVXPOAIMVJITPVJTVTQAFGPTAGZUTPYVUDMJTIKKVGMPTZAYIUHAPFIHI
HIDIGRFVGLAGZIGADRIZDATVNILAIDPOPJXTQAJPGAYAPOAMIJVTPKPYITPVJTQITIN
AHHIXAQIHIGGPOAMTDHTQIJLRVUINAHHIXAKDAFPJKGVNVUTVKJVFQAGAPTTVVLNAIF
QPDATVXGIHCTQAHPTUITPVJLPNMVLEITQAIUTQVGTDHPTFIHTQAIUTQVGVKFIRHVKHU
GOPOIDTDHPFIHIZDATVYVNCDATAPTTVTQAAJMTQIJLHTVRVUPIDHVFVJTQAYVNCATPT
PVJPYVUDMJTZADPAOAPTFIRHVKHUGOPOIDFVJIYVNCATPTPVJLPNMVLEIYVJXGITUDI
TPVJHFQITPHTQAYVNCATPTPVJTDHRVUFVJTLJVFPTZAYIUHAPTPHIJUJLJVFJYVNCAT
PTPVJPFVJMAGAMPKQADPAMZAYIUHAQAFIHIHQINAMZUTPFIJTAMPTTVZATGUACAGQIC
HPGAIDDRMPMJTLJVFPTNPXQTZAIZPTQPTVJVTQAGCDITKVGNHPFIHIDPTTDAHIMZUTP
TFIHXVVMTVQIOAIJABYADDAJTHTVGRHCGAIMPJXTDHPFVUDMDPLATVHAJMIHCAYPIDX
PKTTVRVUIHITQIJLRVUMVYLPNXPKTTDHPTPHTQIJLHTVNRMAIGGAIMAGTQITTQPHHTV
GRQIHYVNAPJTVTQAFVGDMPXIOATQAFGPTAGNRANIPDIMMGAHHIHQAIHLAMTDHIQGPXQ
TPXVTTQANVJATPSITPVJHYQAMUDALPNMVLEIFVFGAIDDRFQAJFPDDPTHTIGTTQPHNIH
TAGCPAYAHQVUDMOAZAAJCIPMKGVNTQAZAXPJJPJXPTFIHIDPATQAFIRHVKHUGOPOIDF
IHIMIPDRHAGPAHHVPFVUDMOAQIMTVHCAJMFVJINVJTQFVJFIHVJAYVJOAJPAJYAHTVG
ADUJYQKVGNATDHTQANVJATPSITPVJHTIGTHTVNVGGVFLPNMVLEITQAJTQAACPDVXUAY
VNPJXTVNVGGVFFPDDZACIPMTDHRAHPNIKGIPMRVUJAAMTVCIRKVGPTLPNMVLEIVKYVU

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GHAPQIOATVCIRPFPDDZURTQADIHTVJATQAGAFIHJVGACDRKGVNTQAIUTQVGIKTAGFIG
MPDVXXAMVUTVKTQAHPTATQAJPKADTTQACAHHPNPHNHPJLPJDITAGTQAIUTQVGDAKTFP
TQVUTIGACDRIKTAGQAHUYYAAMAMNRIMNPGITPVJTUGJAMPJTVCATTREAIDVUHRFQITF
IHPHVABYPTAMKVGPJIJRYIHAPTFIHJTNRJVOADFPDDQAXPOAIXPKTYAGTPKPYITAPTF
VUDMZAXVVMPKPTHKVGFVJITTQITTPNAPFIHTQPJLPJXJIPOADRPMPMJTLJVFIJRTQPJ
XIZVUTFQITFVUDMQICCAJTVTQAFVGDMTQAJABTMIR
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II. Surat Untuk Sang Ratu

Di tengah suasana perang di Prancis pada tahun 1566, Blaise de Vigenère membawa sebuah surat atas nama Raja Charles IX yang memohon perdamaian kepada Ratu Elizabeth I. Surat itu ditulis dalam **bahasa Inggris** dan diamankan dengan **Vigenère Cipher** agar terjaga kerahasiaannya. Kapal berlayar dari Roma menuju London melintasi angin yang tak menentu dan ombak yang menggulung. Di geladak kapal para pelaut menjaga peti kecil berisi naskah itu dengan hormat seolah memeluk harapan agar dua negeri yang terpisah laut dapat kembali tenang.

Namun nasib berkata lain. Satu satunya orang yang mengetahui kunci sandi wafat di tengah pelayaran akibat demam dan kelelahan sehingga rahasia kunci ikut tenggelam bersama napas terakhirnya. Kini naskah itu telah tiba di London tetapi isinya tetap terkunci dan waktu berjalan. Bantulah Ratu Elizabeth I dengan mendekripsi pesan tersebut. Gunakan nalarmu untuk menelaah **pola huruf** dan **panjang kunci** serta terapkan **analisis frekuensi** atau **Kasiski Examination**. Bila berhasil bacakan isi surat itu sebagai suara perdamaian agar perjalanan panjang dari Roma ke London tidak berakhir sia sia.

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LTLTPDLTYELWMQUMISBEVYSXLVJFPPKWZELZBUEFTFBTPTAJPBHNDAVUWCSEAPHMTTC
ITPSXOQVGDUAMRUIKAGFBPTSEJELWUQQNWQMFILRULQDGQNHIJPHWCQJYCGYEJPGJLB
DLNVVMFYWALCUDJUAEUPXGBZQICCTBRDWSKWUNDVOEYZPQZMHCLTPTVLXLOMHRETLSJ
HMKOWIGNUVVVCIANVDHSJPSIZCSSURNWGYWYZHWZQUYEGHCVLWSAZHUHWYEDZVWKCUU
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IGIKAIQXTOWTPELWDWUEGQVMJTRLOMFCIKLSDZXZLZVAGKLVVXEYPAWLPVLSRCIHYMV
MTFIEPZRVAPHCGUARVYKLOIQXIJLYFFRYHZHNPWNHKESVPAWLJUATYPMJUMLAWDVRJH
LWUBKYNUOOLWHTLTHUGPPNXWILAMUMPPKTILHWZNUUCELBCPIVZGHNTXLRPOVGWBKUI
HHLCDXZLZHMICPNJELWWMDWTQMOLCGGTURHHGHFFCXZLKKUCPLLRYHLOMQUGTVWJPEK
KWQIIFPVZOIGBZIUIGZTYPCTPVGNWGTWYPRXYIQWTKZUEDILATHXTPNLRYHEBAWMEGU
DKZASAKKNWGJORDXJLAWLPKUBFWHUHXWUXPZAEOWGVBKYGGZTCPWKTQQXHYOEEPRYSI
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LLPPXAOIYYHGLNZYXZLKROGVZOWCSELIQXXPAHVWILAMUMUTVMFFVHYWYCCELSYZAGM
BHHHJHRGHSJKAPYAVDHVYEDHEIOARYODTWWPAVYIFVWELRVRMSNDTKEITWLOMILXGUD
FQGGUAFCTPJEZQXZLZHVTCDAPESUHTPNWGAUDFPLDQWBDWAFFCGAUODHNUVUCTWAAVR
NLQYTYJSXFWXLGQFACHMKKWPNDVYYZEEFKERLIJFOWZYJZBRGTGAYFFLSSNZUNVOEBT
RYAPHLTHVRVAVGWWVYHVOAKHIKLBROGHLEKFTGUBKLTGMIIXWLVVHMUKYSKLKWUMUUA
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CUDZXQWKQDNTELSJLXAVVRZPTTSKSVGBOKIJVAHVVMFNLRGDHMRRYGWAWEYGGJOXYMR
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ENSSVLXHHSQUTYPJJLVFBRTVWEDIUVVGURQUGIPWKAWVYIVSEUFVSITHNTTTSKZFWOM
OXXPHPCLGWHOUYTFHSJLJWHVGBDPVRRMPWAWDFARHRKTIKSMWCIDLATTXQVNJIDFUAD
PEFKMDMNCJCVDWGUMWBPVIOKSWAKMVWPPARLDXNLVLWTQMFVCWDVVJYMRLRZPRULQQK
JKLTEPKGAQDNXQUIWJSMYUDDTUAYGCIXLZVWAQZEIDLGYMVQTYPLCNSFZQGYGCUYGZV
LAPDNVTHNKDJJLMFIBKUGRYHYVQQAIQAHVPRNVGVUCFMAZCLWHZLHVVVBFELLOQUXBW
AURWKMHZDHIGLSKZFWZERLCDFPITRULADHSIYEREPGYLVICGPTYPVKPLHUCFDIKYIKZ
MGVNPLUKCEDWWZYGUAHREXZLIUNXESEJZRULUDXTUOACWFWRMSNXPNOFOJSPBKUCFAH
REHAZXXNTUHRZDMFNTDNTTZHRWPTLRXXVGKBPWEOIMIIGGAHVJFWJWPYRCBSVQSJUMZ
UGOZTYPWWNCDLPPAEVDQMZBEYENHIELRVOCPUCVOOJPAZVPDPTVHKVYXZLNLYAFZHFF
PVIMSUGFVNVOMXAPHSEWADFHRLOMLLLGHPFYWLVEQMIJHTYLZWJPDHVGKHRYHKZPROA
FIECPJLMZHYDHYEMPRYLPROHGZOWAVSFMUUCFZCYZSDZAKIJNKBVDTSYMGZGQTSVTDM
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NVCWOOWKUKGAABPRHYQCYHKUHVLXGMHHUAUOOLWHJLAWIGGDHREGSUJHLTUAOIPHSUL
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CLWHZWBHYPTYZYLMMDLCQNOFOTWHKHWPPIESFMDAWQZTCYYFFAASTDMZRLRYLTKDPDN
TPNLRYHEBAWXDKUAWCIFJPTOPTYECTEFZEHLLKAHWCEFRVHMHGUGCLRVPADFGGHDPOV
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JMDHSVOOJPAZVULMJULIKHMDSJHMWCTEUOSFVBWBXPRTYLXXYIQWTULEBDCGBZYIXEL
OEWCLVYXCTVAHFDIOOWIIANVWPZYOLIOMDPLEUELWJWXLPILTYLXUVUHMUTVMSPMFNA
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NNPSKPRXVZDXKCUTRRIAMMQAACUDUPGDHZHMUQYPVLGWHVGFPYAHVQEUAQRHHCTOERY
KSWVYIJLIIQSJLQJHWQWEZQCGBIQXIJLKZYKKAIQXIQNEKSIJIMIIGGLUIZTWHAJOPT
KIRYWGMWUXTTHNUEVSMNLWIJLNKSISKDHHIWYEIDAZVXUIUKABPNSFMCVCDPDICWJAU
LQIEQYTWCMWULOSIQAHVTVLYQFEHVOUJELWWMRJAGDHFOIKPZHHDVOIERQGYMWBPPZT
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NPYPSVDSNLZHCVPJAESSDKIPCMGKRVLPEPVTOXGABPELWYCOYDHSANLRVIGPYPUBRVO
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RZZXMULHLIJLCCZECVNCYPNDHVCIUVVVWXGUCVDHAMNHLIJLLRHGSUSHYEJHNUDJJVU
WBGQHTJHLASMWLJVOPVCWMHLHMXPPTJZAFAQPYLJLRVNYKAWPMRQSLZOILOMOULEHNX
TZWLDHLNOHNEZXAJMRZLJHTZDTWYULNIGKAEOAZHBLMUQYBZOHWUARNWCANFYIAZBUU
ERLDSJWMYXUCHGZUTSEJBTHQXNSNFETDLIVYTXLRPQMJLJUUCFIUKTXOPTOMPXLTYZY
KHVGMLJVNVGIJZWXAWVHQLLVJLTLZNQBGILRLAPLMGGXUVDXLOMNCCIDICWEURVRQAG
KGVTXFVBRHAAPNNZVVZJXNXPHCKDLWDQOFRQUFZCQKHNHWDPKUZEWXVZHHVNPSYXIJJ
PDHIUZEKNSETQVMXQUSKZWWABOYRNHIDDJGYTRMHGZIECIULVWSTCYSRYHSWXRCCVQU
URIKVNNHDYUFRTVFLAVNDJLAIELWTPHQXNSRVDXJHQQNWGOERESXNWYYGPVRJLPGUOW
BTEVAJEEFKKRGBCUDKSIHVZWMIQARVLXWUOOCHJZHZAWOPBKBDPVRYPAASTDFHQZEEO
XGFWXNWGUADPWGMBKIHGOIXSPGYLVQWQDICWKACMWBTKYONYGJLLLNPUWLVOKWZNRLI
JLPVLGWZWWBPVFOLXEQQCGATQBRZYXWUBESIJLQLLPAAGRZIJLHFDXSNMVQTCYENTPD
PVJNDQMFVCXZVCJBXJVPVYSZVAWUVGDICWFWHANYSDLYFYHGBZZIGFHNUDISSQKUKGD
RZEXWUTRHVDLCRFWWAPHAGKLFZDKJLIWCTPKWZELLOQVCIKZIEJSMYXRQTTAOHFMWAI

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QIXULTYLXELVRHQQAHJSSJLAKUKGAHFFKZAMWYGPHLFYIHBJOCRCJTWCSEFWXLWCUDF
YIUSMDLRQBNJPPLVBKIHGDHFWMKAMQNDAVURYHOLAKUANZEVQMWSLVMDYUWYPVWAZHH
RJLSXLTWAWGUNEOICOVWUELFANLAIYXGJWXHIIYAZYRGAJXFAGASKSIUHZWQXNSPRDW
SNILHPVKANYPWABKCHDLTYPLSYDHMIDFWYTGZAPHSTCYFZQXWLVVCMVFSZIMKYMPYBD
LRVOMJLUDCCYPTYLPDKCWSPPKRVDTWJBEFPKZEUPZANMQYGGZETCILHZBNDLBSKPHWA
WXLCQUADMEKZIGIGQMHZDQGZBPUYGZTPNLSYTHMXZAOKSIZVTBMTGMRFXVGTMWBXUFE
RCSXVCUFDTKFZQXWLVVCMVFSZI
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**This is a work of fiction. All the names, characters, businesses, places, events, and incidents in this work are either the product of the author's imagination or used fictitiously.*

III. Resep Air Suci Kehidupan

Jung Sinwoo mencari obat untuk ibunya yang menderita penyakit misterius yang disebut "Eternal Slumber". Penyakit ini disebabkan oleh paparan mana (energi magis) dari makhluk-makhluk mitologi yang terlempar ke Bumi. Karena berhutang budi, seorang makhluk mitologi yang pemalas dan tidak suka diganggu memberi Sinwoo resep untuk mendapatkan obat yang disebut "Holy Water of Life". Karena Holy Water of Life bisa menyembuhkan segala penyakit, resep ini selalu dijaga kerahasiaannya dengan enkripsi **Playfair Cipher**. Resep ini telah lama ditulis oleh seorang penerjemah **bahasa Inggris** sehingga sang makhluk mitologi lupa letak kuncinya. Sayangnya, dia juga terlalu malas untuk mencarinya.

Sinwoo telah bertekad untuk mengungkap resep rahasia ini demi kesembuhan ibunya. Sinwoo tidak mampu melakukannya sendirian, tetapi dia juga harus berhati-hati dalam mengungkap keberadaan resep ini. Hanya kamulah yang dipercaya Sinwoo untuk membantunya. Gunakan analisis pola pasangan huruf (bigram), distribusi karakter, dan kemungkinan kata-kata umum dalam teks untuk menyusun kembali matriks kunci. Tolong bantu Sinwoo sebelum semuanya terlambat!

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XUYXHEDVAPYLFHBFYGHUDVTVDADYGRCZTPELHNHNBOADUCEFFGEDMTSIQGDRN
ZGENYEGTCKEPNNEUAGENYEGHNOUKPKEPSNIADFGTHHFCUKTUACFSIPUCNDVFE
HFIYTSSKKEIHUDUXBIOQFHAHUOSPYLSKNSGRTZUTIHHESPFXHFUFVFYSSKRADCN
HUATUMZMNPAUQIGBYOTDSKNEDOUEFFODVTWSIWGNLDEDAUTHETHCUDHLTDED
ACHKZDYYXNOERCFHEFPSYIHYLVTCKEBCBDPIEEDPAMDXYCSSIWBLYDQTSPGCFB
TPUSIISSKTEATZILYBMBYOTQSCDPAEODVTWSIKSDNPHUBURKCPAVIYIIHYXCNTSYT
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CHZTUQPSEFYCPCMLYAGEHFDVFEHFRFCNFPUBQRHTKHSIIHDTRAYDEDYHEDAPOU
CEPACHSITIHEYBRBNYTKYLVTPGHNWDSIQSFWKTFTTUSAYBRBCHXLFPCFDESPTFH
PKEOQYSCFGSHKDAKGUDUOPUSOHDATUAHETPFVTWPNOVPFFHATCEHTGKBYLEE
DFHKEPIFBTCDYHDBMGBDRETHUHYNOLNHTTLHUDMHEAFETRUHEHFFVHNUCYLVT
DYHCBSDFOHSPFACSFEAPDITKMIHETPFVTWYFIXKGDALYPNUVWFFSHCAYYBKTUP
DACKTUHIIHFWNROSXLWTADEFFRNEYHDVFAIEHEFPUBUATHUYPKHNYCVIWTHDMIA
DIHFCFTATUAHEAPLYWDNCVTTHFCSEFTEFFRCUTPBMMYCZDHEDFHZTSISIWSHCD
YYEEDPTVFGTIXCKZKSLEHURFYKEOQYSCFPHWYHCRAHFNHUAFEAPHEHWNTIAZT
WHCHFAAHCYKTLTGETHKEIGFPDYYEEDPTVFKTIHEDSYHYFUTRSIHETVUTIHCOHES
PXYFHYCPCMLYANHUAIHBXXUCSPAUQPHOSIEDALYFHPHXLWTATIAUQPGHCTLSKTK
HCWHNCFYHNIHEDDRBYQSTZAPADEBLYEHTSPSZTWHRANMNXNXNXIDEDATMZMKS
IKHOQCHRCOEYDNHUAMLPAPQCKSPEDTBDTMPSKCUMIHEDAHCBCFACKKEHDYHC
OLMMYEDXFUTXBYLELHNTHHETHXYVTIATUSKOUSKCKNIDVWFYADATKHFEIPTFYDA
BMBYOTPHHCGRQZVLTRKEIHEDFHCKTKHFAIFBHNBMBYOTYLMYDATSGRDTTUKNC
UOPPSCUTZHPNHWHENWFHCDAWDOCFHTSTIUBETEFCNYLZEHDAHEDSIOBFASGHT
DIDFYEEDHYPDPTVFWYYBBYLPSKHEHWNSADCOHEHPHTDITFUBETEFLPAIHPPHAH
EDADIHOSYAUYUCYEEDPTVFMYRSUBQRHESPSFCYHPIRUBETEFWDAPDKWTDYYKR
UTWRCGUHFEFHEHPHYNODIFHCOHEDHOSTPFVTWHESPUXPHFQTHUYPAVUHFPTK
NDEHNPSKSPYNYCKYMILVICNHDTOUBOHHPSLIPLNBMGIHEDWBIFWYSIACOHEDTYD
DTFCTNFVTWETUGDVAPFHLSIHHFDASIRCSOADPSKSNGLMBTTHEKETYMBYOTKEIH
CZAPDKCNLAEDKGPDSFSIDYCEYDDTFCTHEDHYPDPTVFGBHNUCGFHWSPHDFHTUS
ASPADPSKSNGLMGIHESPKENHINPAVUAFHDODADEFBYIVAPHEDETAIACKYLYNNEHD
AHCDRZNSFHDKBIFWYSIASITIADPSKSNGLMGILYDRSBEHSIDVDADADYTUFHYAMISIE
FIHSLTHDFOHHPSLISYTRITWOPUNIALMUCLEETHETATKKERIWDAPHEAFHNFVEDHEH
FLYKEUGHCTWCKOUCHXBLMTUSKDYKTNIRADKBIFWYSIASIDYHEDAHPSLIPLNBMGI
NEFATUFHYASIEFIHSLTHUYPKHNHPPHIANTBYIKCTYEHFTUMLWHIAMIYCBMWTYASIB
HTHEKLYDRIDKGSILNSKTKXYIHDYHEFWYUIACOWHDMYLSKHOFTFTNRUBBTHEDWBI
FWYSIAWDGOUBQRYLIAYDEDMPYHNDBTHPSLIPNEFACFLYFHXSSYDAVTYLONBYNP
MIADPSKSSIBHFBIACDTLBMMLVTHDFCPWFHYNPSCUKTXUYSSKHEFCSBEHEDISQR
DLIDUCLVRLUDUOPAUQPSNPDLFMPTLPSKTEYBRBCHZTVTUQNHWHENWFHCDANHI
LSKHETHHEDWBIFWYSIACOHETPFVTWYCIBOXTWPYHDTUIAYDEDADPSKSPUCNTW
DHNREDNZHEDAHPSLPCSYIHBMBYOTLTVTTUTHTWCTYAPMTHDATSUHHPSLIPLNBM
GIEZSYDITKADPSKSPUCNFESPULWTCKHOAFRBISACKGDFIKIYRDLTZTHDYSTKNMDA
WDOCFHTSPHFTIGCDTUSKATHTHEDWBIFWYSIACODCHDHCCDYCIBTUHYDTBMMIW
DEDHYPTTUYLNPYLKNHNDHEDFHPUCUPHNCVTKDNZSIIHCKYMIMCDTUSKHEDTYDD
TFCDKBIFWYSIABFLEEDHEUBQRAYFCUQPHAESPTLUAHETHHEDAHPSLIPNEFATLQR
YMSLEHNUOCCHXYVTIAYCVIWTDOYDNHUAMLPAPGHFDVDHRADASIDYHEHPNEFAH
NHYCUKHUALPADOCNIATYLCUENRFTZUTIHOSYASOHPMLQZTLSKNUKEOHPSELHNU
TAPYLNCMYYDEDHYPDPTVFGIDVAPSIHEDEYBRBCHSENYLTHKDVDTYGPTYSHIFHTK
HESPSPQSDTYMBYOTYKAPRADATSPRSPELLYDRIDFHTKNMSILSDMHESPKEPIYLNPH
THOEKSILSIAEDADPSKSPUCNAVUDYXSILSPACNESHCHITUVTIPUYIPYIWFURYVTHHF
NTGIPUAFPYNYTHUYIPCKTXDHDRHUCOUYSISIKHFHTKMLUANYTHDACKAHETELHNI

ATKGIHYHPUHSPHYULIDUYIKCDAOYXSFHPPSEFIHFHSKHEDZNTWYCFFANHUAWDU
ASILQYXAPHIIHCHSIHEHFZTWTVUCKPSCUYCFPYPYNAPHICKEXHCUYNPYDEDOHTH
DZTKXYIHTKMYEDSIOCYQTHUYUZPADADAOCFYCUIHOSYAUYPKHNTUPUKTFTTUEL
HNENHFPFYAADPSKSSIADDAGETHUCLPYMUDCBIGNLHFHPDYCHYLCUBFCGYCIBHU
HTYHVFETEFAPUBQRZTIUFBHFSNIHFCBMBYIDHETVHFOCGLOFYXHEDWTHDQDRNP
HWPDIHIHYDEDFHIHCFTHUYIPLYFVETYTTHHFNTGICKEONIHULPBMGKDPPHEOCFYC
IPHYNOYLCUSPDRIBATNGHETVHFZTUTXSDVAPLYNHQSDTDMHYDTPNFHCOCKYNAP
YTIYDRBYLSNCGICYPTYIOCYHEDTYUDRUSIFALYNHFHIHCFTHUYIUFCPTYALYGRUBB
TFHFAPMDVAPUBQRPNUVUFYHHETVCFDEDHDRSBEHDKUBYLDMHETVCFAFCUYPAD
IAEDWDNCVTDRLEFUFHNEFHCKHUHTYHHEHFHPDYCHYLCUBFCGGETHTUOVYPON
MYPTIQSLEHHCSPTPIAEDSFCYHPNHUADRLEFUFHEFIACKOUEFFYYXDHEDZTBMKYT
KONKTYLCUPGHFTVTATPKCISIPHTIAXYFHFXHFEDKEPGTWKTRZNDSIHDEBLYEHEDI
HOSYASODFYEEDPTVFGISIFALYNHIFCHTLHUETWFAHYXLUEFFHPHHCRADAOUMTAP
CKAHEDWHPACHGIDYXLOBYSSKYKBXCNYLMPYLHPTKMLPADADYOUSPYCXLSIDHE
DATHTSPDITUDAHEAPLPHEHEDWBIFWYSIAUMSNIHBRYLNCUAYDTSPRCFDIKCHDMI
HEHPHYNODICHKYYXIWDVLYRCPWRFTZUTGRENDAXBLMTUSKIGNLDHEDWHPACHG
IDYXLKEPIDMDYRDSLDROYUBSGHPFUTSIHNYTHDABYTATUIHYSXBYLCUSFCYHPPH
PGUBBTWDPAFAUQNHFRXBDMHEAFCUIHOSYAUYPKHNIADYUOPYYPONMYHECKLW
UOUBFYUBIAFRETAHEDWHPACHGIDYXLLYSNIHETUVWFPAAHUXDTIFCHTLHUETWFH
UHYNODIFHHEHWAPHFTKIHYXKLUCKPHNHEDVDTIHHFIURFTZUTCOYCSOPHHEHFF
VHNEZHNHINMDAPYPFFHKNAFYXNEFHAHYDEDHWFIYLCKIFCHTLHUSIHDYQURPVTP
QRYLELUBBTWDMLWAYCVIHCSIKHZTQZXYHEDYENNUIFFTDMHEDWHNNYIHOSYASO
FVHNUCEMHNYMOTPYPFFHIAPYHEHFDETAWDAPCKHWFIYLCKIFCHTLTUKCKNPTIAB
CFHTNBFUAHFPYWFFUWTKDNZHEAPNCBMWTTUDMHEDPMYCHVTKHDYSKAPHFTKI
HYXXUEHEDFLUBBTIAETEFZKFBPASKMLGRHEAPURLYXIIHETEFWDAPURVTHESIWG
NLDHEDWHPACHGIDYXLCKFLTCHECKGNDYHEAFBIKDYAPMLYPTNHUAIHBOILSKHEH
WAPHFTKIHYXXOTHTHTSNRCUIHOSYAUYIUFCPTYAPHTVDAZTKCWHDKWTXBDMHE
APHEHFFVHNURVTHESILSUKDHVFAPWDBYBVKEIHEDKGPDSFSIDYYEEDPTVFWYBY
THSILSIAEDMPYHNDBTHPSLIPNEFAEDUCYLFAATEFFRIQTKGYDAVTUQNHWHHETHE
DETAUEITNATDMHDIAUYIAUBIALMUCGEQZVLETHIHESPEDFHTAHETVHPNHWHDCHD
HCCDKGPDSFSIHIHTDIPNUKNSBTDKWTYCFHZTHDYSTKGREZAPYDWDAPPHONFHAT
DMHDVIYLSKYCIPHYNOYLCULPHEUBHIAFSOSILHEDYCFHZTHDYSTKPGLMWIFHEFIA
HEDHOSTPFVTWOFYXNPSILSHICFSLSITKZTLSNCKYSYYKFPNIYAUYPKTRXIIHHEHFA
PFEHFWDCKDTIRNEHEBMBYOTHTIHDAHEDWLYHDCSHPIHEDYCFHZTHDYSTKSPPAF
AUQNHFRLYPHUQPHIANTWYCFHETPFVTWDYOPKNYLCUSFFUHFMIGETHPYLYKEPS
NPDLNSMYLPHEUBDMHEAFCFTVTHHFNTMLELUBBTYKDTYGILNPDLDTFHIWNYTNTL
HTYLSKHEHPETWFCOHETPFVTWHETHBFIAOUBMBYOTGRUDCBTSGRDTAEFVHNIAA
PKHWHTUKCONMYSOTKEDYSHTWHFHIHCFTHUYIZFXTVAPHESPBRTKKEIHCDYAPMT
HDHEDPTVFMYEDFHLOSFFEAPYLSKHEHFHPDYCHYLCUCOCEHDATCSURGEHFDTUA
DRBEFBDFLDTNIAEDYCFHZTHDYSTKBMBYOTQSIXKGDAHNEDIHHCDATHHEDTYDDT
FCDKBIFWYSIAWFSRENIHEDKGPDSFSIYLHITWRETWAHEDCKPGHFTSPSIANSYLCUK
EPIDYOVREFBZTICIWCNHPHCTVHCWATUSCDANUCUYKRUHFSIPUAFYLCUFEAPHED
AHPSLPCBYTHSILSIAEDMPYHNDGINEFAPHTVDADKLYNICETLMLHCFAYHTNIUHCHIVF
FHTSQRMLQRHDTUSCDAGEHFHPDRIBTUBYCBLYKEIGNLDTDMHDVIYLSKCNMLNZED
HYPTEUSIRASIBRPACOHEHFDAZTCGDAHCDTPGLYDQTSPRSIWHSGXBDMHEHFFVH
NUCFHPUCUPHUCSIOCYQTHUYKCUVWFHCDAOFYXHEDWBIFWYSIANCIAHESPWDYK
NYWAAEFVHNUNMZMKDAEDSFHPPHOUIAEDFHTXHCWAATFHHNCUDWRCPAHEAPTH
URVTUFSIHTPUAFPYNYNEYHCOHEDWHNHFHPUFUADALPHECNMLNZSIQGUBUALYZ
TAYEDAHEDCKTKRISPCOHEHWRBSOFTRBAPHFTKIHYXWUHFPFYAMITUSKOUSKRCS
DEZHPTWAFHDAHEDYPSGAYCFTVTHHFNTBYYEEDHYPDPTVFBYYEDNCHSKEKUBBT

RCIBNLDHFXPTLPPCCFZTYLCUCUHTSOCKKHFTPIUDCOYCSOPHFTGRAPUOADEXSL
CFUBIGCTDMHETHXYVTIAGEUDRUTSELHNHNPYURVTHESILSPZTADATSPRPTBTCOM
PPSCUCFMLWAHODTTLSKLPHEFUAPTFHPCKFVLTHKDTUVWFHCDAWDOCFHTSZTMP
ADCFAFCFTUSKLYPHTVDAURBMBYOTOCONPHOUIAEDYCIAAPDYYEEDMPADRUCOY
MFLTSPUHFSIKRFHTHSIKHLSCKHIWFYNYPNCBMMIKTUADACUHEHPDRFHSIHEHWNT
IANHYQPGHFHPDYPAIGBYOTLTVTTUTHTWRFAFRBISVAAHEDUTAPYLYICOHEHPDYPA
NHFHIAHERUDHEDYCFHZTHDYSTKPSSNIHSFHPPHTUIAEDPTVFGIKDPHECHDYHEDP
TVFGBHNADIHFCFTAHDRPHZTHDYSTKUGAFTZDHEDPUYUGICOKECHXYSKHEHFCN
HPLYPHTVDAHEFPUBUATHUYKCKYCFTVTHHFNTMYDNCHSKEKHNUCDVFAIEUYISHIH
KNTIABMBYOTGHNSIADAHEHWNTIAKEGLDALPHEHETVTHHFNTBYIAEDYSEFOGCKZC
YNYIKEPHFHYADACKAEDTOUCSDATSPUTKCNFVLYEHEDZTHDYSTKOCCHBYSKYLVT
DSZTIPVFFHOSWTATMTRUYMNLHPKTEFIHEDSAIXCKLYOLHWCKHETPFGHCOCYSUA
FWAPADKNDTYEHFENFCBYSKDAIHOSBQWGFPLMWTEBLYEGHCCKAEHCHUTSIEEDL
SCKEYTWMYEDBFYGOUREIXCKNHOQYSEFAHEDDSZTIKDTADOHHPHYCRDAHEHWN
TIAPUTKCNDHEDHTSOCKKHNPDADYADYCCHHDHEFWTKCNFVHNDKCKOUPAOUIAED
UBHILNYHURYEEDYNYIHEAFLYRCREIXCKPRBYSOSPEDEOCFTKCULHLTDHEDKCHO
HKCUCKWHFHABSIWBHNRARUAPHEDACIHNYIPFBMKTUACKFVCUFVHNXUCSCKFVN
CUSHTWYCFHEAPFVTOKCIHFLHNXBLMHTDMHETHYLVTHTSOCKKHPGHFDPPHAHFD
IHDKMLGRHEAPFVNCUSHTMYEDFHKEPIRUWFYNTKFHHNCUPSVIMIWDNCNPDHEDF
LHFTWHCWHVFBMWIYBSPEDHUDIOHRIDYPAIHETELHNLYHENPHEFWDFIWDFYEEDP
ABECIHNYIETAUYUADDZDKUBDMHEDHOSTPADIALYRCYEEDHTSOCKKHIHLTFWHNPH
AHUDRXNSNZMIDICSSILHEDIHCFPTURYEEDTIHEYBRBNYTKHFTNIAYXHFTWHWAPH
UHEHFFPCFDHEDHTSOCKKHUGAFTZFWHCDYYEEDPAKFENLYTKFTHCPUHNPHAHYD
EDSFHPAPHATCHEFEUTDFAPADAHEDNCIHWTYCIPHYNOHDOBPSSKHEDHDNCHSKH
NHNHEFPUBUATHUYIKUDCBDAEDTKHECTUAMPGOCKHTIHEDKTIHLTHKFPTADAECH
DYHEDMPADFDUADABMBYOTFHZTSIDAPSWTIAOCCHGELMDVDVETMLSKADFWMILP
HEUBHITCSIKHBFOHHEHFDTURPKHNPSVIWTHEAFHNYMTPIAEDMPADYDEDPAKFEN
LYTKOCYQDALOHEDHDNCHSKHNKENHBMMYUDCOTZLMNTYHRDLTBFLPEYTWYMNL
DTADFWEDHCYIXUPAGOYDETPSQRCOFHMLFPHPNCWFAELTTKCUWBLYETUCIEUYK
CMTSOXIFCOVOFNPHYTHUYISIHTSGSDTGBTRBFIBAHEDIWCNDVTVWDODADEBLYE
HDNCHSKDKHPCOTZLMNTYHYXDV

IV. Eksplorasi Misteri Gunung Padang

Pada tahun 1890 Mr De Corte mengunjungi Gunung Padang di Cianjur. Ia mencatat kejadian yang menurutnya supranatural pada teras batu kompasnya bergetar tanpa sebab jelas bisikan halus terdengar dari celah batu dan satu lempeng terasa hangat sementara yang lain tetap dingin. Seperti tulisan lainnya milik Mr De Corte, **tulisan ini dimulai dengan "Hallo Dagboek"** yang bermakna "Hello Diary" dalam bahasa Belanda. Karena hendak diberikan kepada seorang jurnalis dari Amerika Serikat isi catatan ia tulis dalam bahasa Inggris.

Untuk menjaga kerahasiaan ia mengenkripsi seluruh catatan dengan **Hill Cipher** dan hanya dia yang mengetahui kuncinya. Bertahun tahun kemudian naskah itu ditemukan terkubur di sekitar situs tetapi kunci tidak pernah ditemukan sehingga lembaran huruf yang tampak acak tetap membisu dan para peneliti hanya bisa berharap salam pembuka khasnya memberi celah untuk memecahkan sandi.

Dengan informasi yang ada, anda bisa melakukan ***Known Plaintext Attack*** (KPA) untuk membalikkan matriks kunci dan mendekripsi seluruh teks. Sekarang, kamu harus membantu para peneliti membongkar sandi ini. Gunakan plaintext yang diketahui untuk menghitung matriks kunci, cari invers modulonya, dan gunakan hasilnya untuk mendekripsi pesan yang tersisa. Setelah menemukan isi pesan, sunting hasilnya agar lebih nyaman dibaca.

```
BTTPHJPCNIIEBVNTKORQAOGUITDLACAOZUPUKSLDZPUWZHNXMLEDVEPAFAJNLRZBHCS
QEGDVCQZHSEQCUDARKOONAQAQJLUCYVKLPJOCXSNURTXHDXGCJKXAQQTCFXPWLOIWBY
PGWMPZTEMETWZAJNQHTAYWQMPLDTRKTITEFGDNLDAOCXEHIAEMKAFNPOITRKQLQVGSC
PULVZNTQLCLUOMBVLVZGBQYZGKBXDFAJNJBDRADYRBKCMMMDADSBNZTNBBVQGYEGZCV
DJEEPBXHTKOYQIEXZZYRBXBFACLEAOSIPQJPOXDTRAECUCLQODZLHGSACNFVKMKZLVI
KWJPLKJWALAYROUECIDKJBPKSSQEUIGRHJYAWVXMHKVKOPRAJXLFAOZGNBDWGCIDELY
ZQFTEQVKCXYXRLDEOCOMIEITVXKDQPGSAJKTIVCDAGVAIQIICDIPNFRAJQCOTDLKOPO
KPAJNVLVYGQJHRDMIAUQSDADNXTPBGAHTOTVIJUCJLRZBGHIORRKDVRTIUBYQWIJLCL
PVXMWUBJXTTIMNUQCCGLLFQWVWMMZDDKQIECBBLTVZNAUDSAPBENNXUSQEDBJWFAUUP
KBORKQLQVBUNNAQTUZZMJOZZTXOTIPWEMLAGOCZTYUBNZWUBGAHSPVOMRXEHVCGKTEB
CKLOLHQVWVFSXCZVPGGLFNVMWGRLDDARAADUKFTRGESVXLTJGCWYOHNKUOFUPVSGGEV
YKOOGGDRLDZUBLAMXRTBEI
```

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V. [Bonus] Misteri Penampakan di Gunung Padang

Suatu malam di teras batu Gunung Padang para peneliti melihat kilau tipis yang menari di antara susunan megalit dan mendengar dengung rendah seperti napas dari dalam bukit. Untuk mencegah kepanikan dan gosip mereka sepakat merahasiakan semua foto temuan lapangan berformat **JPEG** dengan **Affine Cipher dalam ruang 256 karakter ber-kunci acak** menyandikan tiap berkas catatan foto serta rekaman menjadi deret byte yang tampak tak bermakna. Perlu diketahui bahwa nilai b dan m dihasilkan secara acak. Untuk memulihkan gambar ini,

Kamu harus terlebih dahulu menemukan kedua nilai tersebut. Namun, kamu **TIDAK DIPERBOLEHKAN** menggunakan metode pencarian kunci secara menyeluruh (*exhaustive key search*). Berikut adalah kode yang digunakan peneliti untuk mengenkripsi fotonya:

```
import math
import random

def affine_cipher(hex_values, m, b, n):
    cipher_hex = [(hex((m * int(value, 16) + b) % n)) for value
                  in hex_values]
    return cipher_hex

def read_image_to_hex(image_path):
    try:
        with open(image_path, "rb") as image:
```

```
            byte_data = bytearray(image.read())
        return [hex(byte) for byte in byte_data]
    except FileNotFoundError:
        print("Error: File not found.")
    except ValueError as e:
        print("Error:", e)
    return None

def array_of_hex_to_bytearray(array_of_hex):
    bytearray_data = bytearray()
    for hex_value in array_of_hex:
        byte_value = (
            int(hex_value, 16) if hex_value.startswith("0x") else
            int(hex_value)
        )
        bytearray_data.append(byte_value)
    return bytearray_data

def create_file_from_bytes(file_path, bytes_data):
    try:
        with open(file_path, "wb") as file:
            file.write(bytes_data)
        print("File successfully created:", file_path)
    except Exception as e:
        print("Error:", e)

def main():
    image_path = "./flag.jpg"
    n = 256
    b = random.randint(1, n)
    m = random.randint(1, n)
    while math.gcd(m, n) != 1:
        m = random.randint(1, n)
    hex_values = read_image_to_hex(image_path)
    if hex_values:
        cipher_hex = affine_cipher(hex_values, m, b, n)
        bytearray_cipher = array_of_hex_to_bytearray(cipher_hex)
        create_file_from_bytes(image_path, bytearray_cipher)

if __name__ == "__main__":
    main()
```

Gambar terenkripsi dapat diakses melalui: https://drive.proton.me/urls/2XY3EXERT4#p7jLnqs5Drgk

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