

LAB 4

Frequency analysis

EXPERIMENT 4.1. Try out the following command: `LetterCounts["Hello World"]`

- (a) What does it do?
- (b) Add the option `IgnoreCase -> True`. How does that change things?
- (c) Find a long piece of text online. Use the following command to save its data: `a = Normal[Sort[LetterCounts[your_text, IgnoreCase->True]]]`
- (d) Repeat with two more so you also have variables *b* and *c* corresponding to two other pieces of text.
- (e) Display all three using the command `TableForm[Transpose[{a,b,c}]]`. What do you notice?

PROBLEM 4.2. Use what you learned above to crack the following substitution cipher:

```
wx kop xzr grpx qs xwnrp, wx kop xzr kqvpq qs xwnrp, wx kop xzr
oar qs kwptqn, wx kop xzr oar qs sqqbwpzmrpp, wx kop xzr ryqcz
qs grbwrs, wx kop xzr ryqcz qs wmcvrtdbwxf, wx kop xzr propqm
qs bwazx, wx kop xzr propqm qs tovimrpp, wx kop xzr pyvwma qs
zqyr, wx kop xzr kwmxrv qs trpyowv, kr zot rlrvfxyzwma grsqvr dp,
kr zot mqxzwma grsqvr dp, kr krvr obb aqwma twvrcx xq zrolrm, kr
krvr obb aqwma twvrcx xzr qxzrv kof--wm pzqvz, xzr yrvwqt kop pq
sov bwir xzr yvrprmx yrvwqt, xzox pqnr qs wxp mqwpwrpx
odxzqvwxwrp wmpwxrt qm wxp grwma vrcrwlrt, sqv aqqt qv sqv
rlwb, wm xzr pdyrvboxwlr travrr qs cqnyovwpqm qmbf.
```

PROBLEM 4.3. Use what you learned above to crack the following substitution cipher:

gbsbm vzszyg mmqmd czijl bgyjz savzg mdgbs sqlsm xgbst jiiel sjgzg
 mmqmd jgzmw dcdqi mmhsq mvgmt sycky mcqzo yscqm xwszyg pmvdg yfxcy
 nicdq dmgyy sncyh ckisb mvzsk fcdfn scdzj gwczc kmvgyg bjygf fscyz
 miqzr vcggy zbzrv cyjzb ncqsm xkyjp hcdqb cqxmv ywjdq mwzzyg gjdgb
 sxymd gmxcz jescd qoymo mygjm dwbjp bnmys myisz zsucp gifxc jisqg
 moisc zsgbs sfsyb smdif osyzm dxmyw bmnbg sbmvz swczj dcdfw cfzos
 pjciw czcyg bvyqs dgdcd gbcgw czmdi fkspc vzszyg bcoos dsqgm ksgbs
 mdsbs ijtsq jdbsb cqijt sqjdy gxmyc kmvgyg byssf scyzs tsyzj dpsbs
 bcqnm tsqmv gmxim dqmdk spcvz sjgnc qsbjn dsytm vzcdq jyyjg ckisb
 swczc kmvgyg bjygf czwsi igcii qcyhb cjysq cdqds tsyrv jgscg sczsz
 jgbbj nzsix gbsgb jdlgb cgvzs qgmwm yyfbj nnmzg wczgb sxcpg gbcgo
 smois ciwcf zvzsq gmczh bjnwb cgbsw czimm hjdlz mwmmy jsqck mvgsb
 wmyhs qjdim pciyc qjmw b jpbbs ciwcf zvzsq gmgsi ibjzx yjsdq zwczc
 imgnm ysjdg syszyg jdlgb cdgbs foymk ckifg bmvlb gjgwc zgmmn mzgmx
 bjzxy jsdqz wmyhs qjdcq tsygy zjdl

PROBLEM 4.4. Use what you learned above to crack the following substitution cipher:

AQJCP	KLLSL	QQVLJ	VPKFR	SMJDO	KBLKH	?SQRV	HQMMO
KDJKE	?J'EK	AQFYO	KIJHF	YKCI.	JMQRL	AH'DV	HQMMO
KDDQA	QMJDO	QHPJZ	JYKRF	ODJD!	SQRVH	QM, JX	RID, A
QDOJH	FI. DO	PEQUO	KIBLK	HI, DO	PYQBI	OKWPB	LKHI,
FQCAQ	H' IFQ	DBLKH	I. SQR	VHQM,	DOPS'	CPIYO	PEPCI
. IYOP	EPCID	CSJHF	DQYQH	DCQLD	OPJCM	QCLAI	. J'EH
QDKIY	OPEPC	. JDCS	DQIOQ	MDOPI	YOPEP	CIOQM	,BKDO
PDJY,	DOPJC	KDDPE	BDIDQ	YQHDC	QLDOJ	HFICP	KLLSK
CP. IQ	,MOPH	JKS,	KO, YQ	EPOPC	P, MOP	HJKS	DOKDS
QRKHA	SQRCF	JCLZC	JPHAM	KIHQD	OJHFB	PCIQH	KL, SQ
RVHQM	DOKDJ	'EDPL	LJHFD	OPDCR	DO. JD	'IDOP	IYOPE
PCIDO	KDBRD	SQRMO	PCPSQ	RKCP.	SQRMP	CPKIY	OPEPC
, SQRO	KABLK	HI, KH	ARO, L	QQVMO	PCPDO	KDFQD	SQR. J
XRIDA	JAMOK	DJAQU	PID. J	DQQVS	QRCBL	KHKHA	JDRCH
PAJDQ	HJDIP	LZ. LQ	QVMOK	DJAJA	, DQDO	JIYJD	SMJDO
KZPMA	CREIQ	ZFKIK	HAKYQ	RBLPQ	ZURLL	PDI. O	E?SQR
VHQMM	OKD, S	QRVHQ	MMOKD	JHQDJ	YPA?H	QUQAS	BKHJY
IMOPH	DOJHF	IFQKY	YQCAJ	HFDQB	LKH. P	WPHJZ	DOPBL
KHJIO	QCCJZ	SJHF.	JZDQE	QCCQM	JDPLL	DOPBC	PIIDO
KDLJV	PKFKH	FUKHF	PC, MJ	LLFPD	IOQD,	QCKDC	RYVLQ
KAQZI	QLAJP	CIMJL	LUPUL	QMRB	, HQUQ	ASBKH	JYI, U
PYKRI	PJD' I	KLL, B	KCDQZ	DOPBL	KH. UR	DMOPH	JKSD
OKDQH	P, LJD	DLPQL	AEKSQ	CMJLL	AJP, M	PLLD	PHPWP
CSQHP	LQIPI	DOPJC	EJHAI!				