



# DECUS

## PROGRAM LIBRARY

DECUS NO.

FOCAL8-5

TITLE

THE SUMER GAME

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## THE SUMER GAME

DECUS Program Library Write-up

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### ABSTRACT

Imagine that you are living in the city of Sumer, in the year 3000 B.C. You are the king and each year you must decide how much of the city's store of grain will be given to the people as food, how much will be used for seed, and how much will be kept in storage.

At the beginning of each year your steward, Hamurabi, makes a report and asks for your decisions. The following information will assist you in formulating those decisions.

Each person needs 20 bushels of grain per year as food. If insufficient food is distributed, some people die of starvation. Half a bushel of grain is needed to plant one acre of land, and one person can plant and harvest 10 acres. The average harvest is 3 bushels per acre, but better or poorer harvest are common.

Land may be bought or sold. The price varies from year to year, but averages one acre for 20 bushels of grain.

Varying factors include the immigration of new people to the city (which is influenced by the city's prosperity), the fact that rats occasionally eat a portion of the grain left in storage, and the occasional epidemic of plague.

### OPERATION

The program is written in the FOCAL language and will run on a 4K PDP-8. To start the program, type "GO," followed by a carriage-return. Type a space following any response made to a question asked by the program. To terminate the program at any time, type CTRL/C.

If it is desired to start the program with a special set of starting conditions, type "GO 7.5" followed by a carriage-return. The program will request starting values for the number of acres of land (A), the amount of grain in storage (S), and the city's population (P). It will then proceed in the normal fashion. Using this technique will enable one to continue a simulation that was previously interrupted for some reason.

Note that FOCAL must be loaded without the extended functions.

### SPECIAL OPERATION

The random number function in FOCAL is not adequate for the production of random numbers for the SUMER Game. The following patch, which is valid for DEC-08-AJAD-PB (FOCAL.W), must be made in order for the program to function properly.

2672/5170  
0170/2573  
0171/5574  
0172/5574  
0173/2372  
0174/2670

This patch will not affect FOCAL's operation for other programs.  
It will, in fact, improve any gaming-type program which uses  
random numbers.

C-FOCAL , 8/68

Ø1.1Ø S P=95;S S=28ØØ;S H=3ØØØ;S E=2ØØ;S Y=3;S A=1ØØØ;S I=5;S Q=1

Ø2.1Ø S D=Ø

Ø2.2Ø D 6;T "I BEG TO REPORT THAT LAST YEAR"D," DIED OF STARVATION,

Ø2.25 T !I," PEOPLE CAME INTO THE CITY,";S P=P+I;I (-Q) 2.3

Ø2.27 S P=FITR(P/2);T !"HALF THE PEOPLE DIED FROM A PLAGUE EPIDEMIC,

Ø2.3Ø T !"AND THE POPULATION IS NOW"P,!!"THE CITY NOW OWNS

Ø2.35 T A," ACRES OF LAND."!!;I (H-1) 2.5;T "WE HARVESTED

Ø2.4Ø D 3.2;T " THE HARVEST WAS"H," BUSHEL."!E

Ø2.5Ø T "BUSHEL OF GRAIN WERE DESTROYED BY RATS AND YOU NOW HAVE

Ø2.6Ø T !S," BUSHEL IN STORE."!!!DO YOU WISH TO CONTINUE?

Ø2.7Ø A " (ANSWER YES OR NO)"Q,!;I (Q-ØNO) 2.8,7.4

Ø2.8Ø I (Q-ØYES) 2.7,3.1,2.7

Ø3.1Ø D 6;D -;S Y=C+17;T "THIS YEAR, LAND MAY BE TRADED FOR

Ø3.2Ø T Y," BUSHEL PER ACRE;" ;S C=1

Ø3.3Ø A !"HOW MANY ACRES DO YOU WISH TO BUY?"!Q;I (Q) 7.2,3.6

Ø3.4Ø I (Y\*Q-S) 3.9,3.6;D 4.6;G 3.3

Ø3.5Ø D 4.5;G 3.3

Ø3.6Ø D 3.9;G 4.8

Ø3.7Ø S A=A+Q;S S=S-Y\*Q;S C=Ø

Ø3.8Ø A !"TO SELL?"!Q;I (Q) 7.2,3.9;S Q=-Q;I (A+Q) 3.5

Ø3.9Ø S A=A+Q;S S=S-Y\*Q;S C=Ø

Ø4.1Ø T !"HOW MANY BUSHEL OF GRAIN DO YOU WISH TO DISTRIBUTE

Ø4.11 A " AS FOOD?"!Q;I (Q) 7.2;I (Q-S) 4.2,4.7;D 4.6;G 4.1

Ø4.2Ø S S=S-Q;S C=1

Ø4.3Ø A !"HOW MANY ACRES OF LAND DO YOU WISH TO PLANT WITH SEED?"!D

Ø4.4Ø I (D) 7.2;I (A-D) 4.45;I (FITR(D/2)-S-1) 4.65;D 4.6;G 4.3

Ø4.45 D 4.5;G 4.3

Ø4.5Ø D 7;T A," ACRES."!

Ø4.6Ø D 7;T S," BUSHEL IN STORE."!

Ø4.65 I (D-1Ø\*P-1) 5.1;D 7;T P," PEOPLE."!;G 4.3

Ø4.7Ø D 4.2

Ø4.8Ø D 6;T "YOU NOW HAVE NO GRAIN LEFT IN STORE, SO YOU HAVE

Ø4.9Ø T !"NONE LEFT TO USE AS SEED THIS YEAR."!;S D=Ø

Ø5.1Ø S S=S-FITR(D/2);D 8;S Y=C;S H=D\*Y

Ø5.2Ø D 8;S E=Ø;I (FITR(C/2)-C/2) 5.3;S E=S/C

Ø5.3Ø S S=S-E+H;D 8;S I=FITR(C\*(2Ø\*A+S)/P/1ØØ+1);S C=FITR(Q/2Ø)

Ø5.4Ø S Q=FITR(1Ø\*FABS(FRAN()));I (P-C) 2.1;S D=P-C;S P=C;G 2.2

Ø6.1Ø T !! "HAMURABI: "%5

Ø7.1Ø I (C) 7.2;S C=C-1;D 6;T "PLEASE THINK AGAIN. YOU HAVE ONLY";R

Ø7.2Ø T !"HAMURABI HAS GONE ON STRIKE! YOU WILL HAVE TO STOP

Ø7.3Ø T !"AND FIND YOURSELF ANOTHER STEWARD!"!!

Ø7.4Ø T !"GOODBYE!"!!;Q

Ø7.5Ø A ?A S P?;G 3.1

Ø8.1Ø S C=FITR(5\*FABS(FRAN()))+1

\*

# VARIABLES USED IN THE SUMER PROGRAM

<u>VARIABLE</u>	<u>FUNCTION</u>
P	*population
S	*bushels in storage
H	*harvest in bushels
E	*bushels eaten by rats
A	*number of acres
I	*increase in population
Y	*harvest yield in bushels/acre cost of land in bushels/acre
D	*number dead of starvation number of acres to plant
C	number of people who are fed random number Hamurabi's "patience counter"
Q	number of bushels to distribute as food number of acres bought or sold plague switch answer to questions

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10 variables \* 5 locations/variable = 50 locations for variable storage

\*typed out during yearly summary