**Index to LIFE 3000**

This Index lists the Topics available in the LIFE 3000 help.   If you are new to LIFE 3000, select Description, then select Life Process Commands.

**Topics**

## Life Description

The <u>Game of Life</u> is a simulation of the <u>life generations</u> of a one-celled animal in their own little <u>world</u>. The game works as follows:   Life cells are placed in various positions on their world.   Once placed, the life generations can commence.   In every life generation, some life cells may die and some new life cells may be born.   The classic rules for survival and birth are: for a cell to survive to the next generation it must have at least 2 and no more than 3 <u>neighbors</u>, for a cell to be born in a empty position the empty position must have exactly 3 neighbors.   In LIFE 3000 the <u>birth rate</u> and <u>survival rate</u> can be changed, and many other options can be set.

<u>Life generations</u> can have interesting proprieties, it is possible that the all cells die and leave <u>no life</u>. The life pattern may not change from generation to generation resulting in <u>stable life</u>.   A life pattern may also repeat every so many generations and be <u>repeating life</u>.   LIFE 3000 can detect all forms of life patterns.

LIFE 3000 has many additional features.   Life patterns can be saved to disk, you can <u>undo</u> a pattern, and save and restore a <u>snapshot</u> of a life pattern.   The <u>world size</u>, <u>edge wrap</u>, and <u>background color</u> can be set, as well as the <u>cell shape</u> and <u>cell color</u>.   The <u>background speed</u> processing and whether LIFE 3000 should display an <u>icon graphic</u> or <u>life generations</u> can also be chosen.

## Life Process Commands

### Mouse Cell Changing Commands

The mouse is used to Create or Destroy life cells on the <u>world</u> grid.   The left mouse button will create or destroy life cells based on the Create or Destroy radio button.   The right mouse button will change the value of the selected cell.   Dragging the mouse with the right button down will continue to destroy or create cells based the original cell selection.

### Keyboard Cell Changing Commands

Tabbing from the life speed scroll bar places a 'X' cursor on the life world area.   The up, down, left, and right arrow keys move the cursor.   Based on the Create or Destroy radio button, the Space bar create or destroys life cells.   Shift-Arrow creates or destroys life in a line of the arrow direction.   The Home, End, PgUp, and PgDn keys move the cursor to the left edge, right edge, top edge, and bottom edge of the world.

### Life Process Controls

**Procreate:**   Starts the <u>life generations</u>.
**Suspend:**   Suspends the processing of life generations.
**One Cycle:**   Processes one generation of life.
**<u>Xenocide</u>:**   Destroys all life on the world and resets life statistics.
**Create:**   Set life cell create mode.
**Destroy:**   Set life cell destroy mode.
**Life Speed Scrollbar:**   Set the speed of life generation processing.   The slowest speed is approximately once every two seconds.   The fastest speed can up to one generation every 1/18 of a second.   The highest speed is not recommended for large world sizes or slower processors.

## File Menu Commands

The File menu allows a life <u>world</u> to be Opened or Saved.   The items saved in a life world file are: the world and life on it, the <u>world settings</u>, the <u>pattern test options</u>, and <u>preferences</u>.

The Exit option closes the LIFE 3000 program.

# Edit Menu Commands

**Edit Commands**
    **Undo:**   Restores a previous <u>world</u> state.   Restores a last <u>static</u> version of the life world.
    **Snapshot:**   Saves a "snapshot" of the current life world.
    **Restore:**   Restores a saved snapshot of the life world.

# World Dialog Controls

**World Controls**

    **World Size:**   The <u>world</u> is square and can be set from 10 to 80 cells wide.

    **World Edge Wrap:**   The edge wrap sets whether life cells at the edge of the world wrap around to the other side or stop at the edge.

    **Mutations:**   Specifies the number random cells to be added to the world every generation. Mutations can be off, or set from 1 to 100 per generation.   When mutations are turned on all <u>pattern tests</u> are turned off.

    **Birth Rate:**   Sets the minimum number of <u>neighbors</u> necessary and the maximum allowed for a cell to be born in an empty location from one generation to the next.   Can be set from 0 to 8.

    **Survival Rate:**   Sets the minimum number of neighbors necessary and the maximum allowed for a cell to survive from one generation to the next.   Can be set from 0 to 8.

# Pattern Tests Dialog

**Pattern Tests:**   Turns on repeating life pattern testing.   A repeating life pattern is a <u>world</u> whose state is *exactly* the same on successive generations.   When Pattern Tests are selected both Stable Life and No Life tests are automatically performed.

**Complete:**   Tests for life patterns that repeat ever two or more generations.   In LIFE 3000 version 1.0, the complete tests can not detect all repeating patterns.   However, a repeating life pattern is never incorrectly detected.

**Simple:**   Simple pattern tests only check for patterns that repeat every two generations.   The tests are not conclusive.   If LIFE 3000 detects a possible repeating pattern it will prompt to stop, continue, or stop tests and continue.

**Maximum Repeat Value:**   For complete pattern tests this sets the maximum number of successive generations to check for a possible repeating pattern.   For simple pattern tests this sets the number of generations that must occur with no change in population for a suspected repeating pattern to be flagged.

**Stable Life Test:**   This tests for life that does not change from one generation to the next.   Selecting this test also selects no life testing.   Deselecting this test also unselects pattern testing.

**No Life Test:**   This tests for the death of all life in the world.   Deselecting this test also deselects stable life and repeating pattern tests.

## Preferences Dialog

**Preferences**
> **Cell Shape:**   The life cells can be set to be squares or circles.
> **Cell Color:**   The cell color can be selected from the palette or set to random colors.   With random colored cells each generation of cells gets a new color.
> **Background color:**   This sets the color of the life <u>world</u>.

## Background Processing Speed

The Background Processing Speed sets the speed that LIFE 3000 processes generations when it is not the active application.
**None:**   No background processing.
**Slow:**   Approximately one <u>life generation</u> every two seconds.
**Medium:**   Process at the speed half way between the slow speed and the active application speed.
**Fast:**   Process at the same speed that the active application is set for.

## Icon Display Options

The Icon Display Options selects what the LIFE 3000 icon should display when the program is minimized.

**Graphic:**   Display a graphic of a single life cell.

**Life Generations:**   Display a shrunken version of the life <u>world</u>.

## The Game of Life

The Game of Life was invented by John Horton Conway.   It first appeared in late 1969 & early 1970 in Scientific American.

**Life Generation:** one complete cycle of a life pattern.   When all deaths and all births of a current life pattern have been updated on the **world**, one life generation has occurred.

**World:** the place where the life cells exist.   In LIFE 3000 the world is square, and from 10 to 75 cells wide.   The world can be configured so that life wraps around the edge or not.   In the classic mathematical **Game of Life** the world size is infinite.

**Neighbors:** the life cells in the eight positions that surround and are touching the life cell.   In the example shown the center life cell has four neighbors.

**Procreate:**   To produce others of one's kind.

**Xenocide:**   The destruction of all alien or strange life.

**Static:**   A non-procreating life world.   (Does not refer to a **stable** life world).