

Outline for May 24, 2002

Handouts: *Tnone*

Reading: Johnsonbaugh and Kalin, pp. 679–702 (appendix of useful functions)

1. Greetings and felicitations!
2. Libraries
 - a. compiling with libraries
 - b. common libraries: `stdio`, `ctype`
3. Standard I/O Library (`#include <stdio.h>`)
 - a. open file: `fopen`
 - b. unstructured read/write: `getchar`, `fgetc (getc)`, `putchar`, `fputc (putc)`
 - c. formatted read/write: `fgets (gets)`, `fscanf`, `fputs (puts)`, `fprintf`
 - d. structured read/write: `fread`, `fwrite`
 - e. random access: `fseek`, `ftell`, `rewind`
 - f. close file: `fclose`
 - g. miscellaneous: `feof`, `ferror`, `clearerr`
4. Character types and conversions (`#include <ctype.h>`)
 - a. alphabetic, numeric, alphanumeric: `isalnum`, `isldigit`, `isxdigit`, `isalpha`
 - b. upper, lower, and conversions: `isupper`, `islower`, `toupper`, `tolower`
 - c. types of chars: `isctrl`, `isgraph (not blank, printable)`, `isprint (printable)`, `ispunct`, `isspace`
5. String conversion (`#include <stdlib.h>`)
 - a. string to number: `atoi`, `atof`, `atol`
6. String functions (`#include <string.h>`)
 - a. compare: `strcmp`, `strncmp`, `strcasemp`, `strncasemp`; `memcmp`
 - b. copy: `strcpy`, `strncpy`; `memcpy (no overlap)`, `memmove (overlap okay)`
 - c. find character: `strchr (index)`, `strchr (rindex)`, `strpbrk`; `memchr`
 - d. length: `strlen`
7. Memory management (`#include <stdlib.h>`)
 - a. Allocation: `malloc`, `calloc`
 - b. Release: `free`, `cfree (deprecated)`
 - c. Reallocation: `realloc()`
8. Miscellaneous
 - a. terminate program (`exit`); include `<stdlib.h>`
 - b. sort array of data (`qsort`); include `<stdlib.h>`
 - c. time of day (`time`, `ctime`); include `<time.h>`
 - d. execute `cvommand (system)`; include `<stdlib.h>`
9. Debugging
 - a. programs have bugs; find and fix them
 - b. static debugging: insert debugging code into source, recompile and run
 - c. dynamic debugging: look at the program as it runs, observing (and maybe changing) variables, etc.
10. Static debugging

- a. using printf to print variable values; mention %p (prints pointer value, usually as a hex integer)
 - b. using printf to print where you are (ie, on function entry printf("in function\n"));
 - c. #ifdef DEBUG ... #endif around the printf's so you can leave them in the source if you need them again
 - d. assert(x) macro: assert(0 <= i && i <= n) causes program to exit with error message if (0 <= I && I <= n) is false; must include <assert.h>. To delete, say #define NDEBUG and they will not be in the compiled code.
11. Dynamic debugging
- a. debugging tool instruments executable program so it can be stopped, examined, altered, and continued interactively
 - b. go through the handout
 - c. mention the "where" command which shows you the program stack