

CISP365 Practice Midterm 2

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Instructions: You may bring any material that is handwritten or printed *prior* to the examination to help you. You can also bring a calculator if you think it may help you. However, you can only use the calculator for numerical computations only. You *cannot* let your calculator compile a program, or to communicate with others.

You, as an individual, are expected to do your own work. This means you cannot seek, receive or otherwise acquire any assistance except clarifications from the professor during an examination. Any communication involving the contents of the subject matter or the examination is considered cheating. Do not initiate or accept such communication, or the result of your examination is automatically voided.

New rules, read this! As of 2003.09.22, I no longer deduct points for wrong answers. Each correct answer is worth one point, each wrong answer is worth zero point, and each unanswered question is also worth zero point. This means you *should* guess and leave no question unanswered.

As a result, I also need to adjust the letter grade assignment break points. For your individual examination, “A” means at least 94%, “B” means at least 74%, “C” means at least 54%, “D” means at least 34% and “F” means below 34%. The break points for the final grade are now 26.83%, 48.5%, 70.17% and 91.83% as minimums for “D”, “C”, “B” and “A”, respectively.

Please note that this change does not affect your letter grade at all, it is just a number game to make some people feel better about guessing.

Make sure you write down you name on the upper right corner *first*, otherwise I cannot give points to anonymous students!

The baseline is XX, there are XX questions.

1 What integer value is returned by the following function `f` when invoked as `f('00231')`?

```
function f(s : string) : integer;
var
  i : integer;
  x : integer;
begin
  x := 0;
  for i := 1 to length(s) do
    if (s[i] >= '0') and (s[i] <= '3') then
      x := x * 4 + (ord(s[i]) - ord('0'));
  f := x
end;
```

- A 231
- B 45
- C 4^5
- D 4^6
- E 142

2 Observe the following program:

```
type
  n = record w, x : integer end;
var
```

```

    a : array [0..4] of n;
    i,j : integer;
begin
  for i := 0 to 4 do
    read(a[i].w, a[i].x);
  j := 0;
  for i := 0 to 4 do
    begin
      write(a[j].w, ' ');
      j := a[j].x
    end
  end.

```

Given that the input to this program is as follows:

```
23 4 102 2 34 3 32 0 299 1
```

What is the output of this program?

- A 4 3 1 2 0
- B 2 3 4 0 1
- C 23 299 23 299 23
- D 23 299 102 34 32
- E 102 23 34 299 32

3 What is the value returned by `f('this is insane!', 's')`, given that the function is defined as follows?

```

function f(s : string; c : char) : integer;
var i, x : integer;
begin
  x := 0;
  for i := 1 to length(s) do
    if s[i] = c then
      x := x + 1;
  f := x
end;

```

- A 0
- B 1
- C 2
- D 3
- E 4

4 What is the printed output of the `p('vashTheStempe')`, given that procedure `p` is defined as follows?

```

procedure p(s : string);
var i : integer;
begin
  for i := 1 to 6 do
    if i <= length(s) then
      write(s[i])
    else
      write('*')
  end;

```

- A vashTh
- B vashTh*****
- C *****empede
- D vashTheStempede
- E 123456

5 Observe the following definitions:

```

type
  t1 =
    record
      a : array [0..9] of integer;
      b : string [20];
      c : integer
    end;
  t2 =
    record
      x : array [0..29] of t1;
      y : array [0..29] of integer;
      z : integer
    end;
var
  v1 : t2;

```

Which of the following expression is not valid? Some expressions may not return a built-in type, but they are still syntactically correct as parameters.

- A v1.z
- B v1.y[2]
- C v1.x[v1.y[v1.z]].b[2]
- D v1.a[length(v1.b)]
- E v1.x

6 Observe the following definitions:

```

type
  t1 = array [0..9] of integer;
  t2 = array [0..2] of t1;
var
  v1 : t2;
procedure p1(var x : array of integer);
begin
  (* ... whatever p1 does *)
end;

```

Which of the following invocation does not generate a compile-time error?

- A p1(v1[2])
- B p1(v1)
- C p1(v1[2][1])
- D p1(v1.t2[0])
- E p1(v1[1][2][1])

7 Which of the following procedures open a file already associated with a `file` variable for reading only?

- A rewrite
- B append
- C assign
- D close
- E reset

8 When a file is closed by the `close` procedure, what does it mean?

- A The file is deleted
- B The file is ready for reading
- C The file is ready for writing
- D The program has finalized its access to the file
- E The file is reset to be have a size of zero

9 In the following program, what can replace `----` so that the program compiles without any errors?

```
(* ... a whole bunch of user defined types *)
var
  outfile : text;
  x : ----;
begin
  (* ... to initialize infile for writing *)
  write(outfile, x);
  (* .. other operations)
end.
```

- A only boolean
- B only integer
- C only real
- D can be any one of the above
- E can be any type, including user defined ones

10 Global variables should not be accessed directly because they can be shared among subroutines, causing much trouble. What is the output of the following program?

```
var
  i : integer;
procedure p1(x : integer);
begin
  i := x;
  while (i > 0) do
    begin
      write('*');
      i := i - 1
    end;
  writeln
end;

procedure p2(x : integer);
begin
  i := 0;
  while (i < x) do
    begin
      p1(i+1);
      i := i + 1
    end;
end;
```

```

        end
    end;

begin
    p2(3)
end.

```

A ***

B *

**

C ***

**

*

D this program does not terminate, it keeps printing **

E this program does not terminate, it keeps printing *

11 What is the output of the following code, assuming variable `x` has a value of 27?

```

if x < 20 then
    writeln('do')
else if x < 25 then
    writeln('re')
else if x < 30 then
    writeln('me')
else if x < 35 then
    writeln('fa')
else
    writeln('so')

```

A do

B re

C me

D do

re

E me

fa

so

12 What is the largest value that can be represented by a 16-bit `integer` variable?

A 0

B 16

C 32768

D 32767

E 65536

13 Will the following code compile (despite warnings)? If not, why is that? If it compiles, what is the output of this program?

```

var
    bad_global : boolean;
function f : boolean;
begin
    f := not bad_global

```

```

    end;
begin
    if f = bad_global then
        writeln('weird')
    else
        writeln('strange')
    end.
end.

```

- A it does not compile because `f = bad_global` should have been `bad_global = f`
- B the program compiles, but it crashes when it runs
- C the program compiles, it prints `weird`
- D the program compiles, it prints `strange`
- E the program compiles, what it prints depends on the value of the uninitialized variable `bad_global`

14 What is printed when the following program executes?

```

function f1 : integer;
begin
    f1 := 4
end;

function f2(x : integer; y : integer) : integer;
begin
    f2 := f1 * x + y
end;

begin
    writeln(f2(f2(f1,2),f1+2))
end.

```

- A 24
- B 52
- C 78
- D 422
- E 424

15 What is the output of the following code, given that `x`, `y` and `z` are `integer` variables?

```

while (x < y) and (y < z) and (z < x) do
begin
    writeln('*');
    x := x + 1;
    y := y - 1
end;

```

- A this is an infinite loop, it keeps printing `*`
- B there is a syntax error with this code
- C this code crashes
- D this code prints some finite lines of `*`, but the number of such lines is determined by the values of the variables
- E this loop is not infinite, and nothing is printed

16 Given that `b` is a `boolean` variable, `i` and `j` are `integer` variables, which of the following statement does not compile?

- A `b := j < i;`
- B `b := b or (i <> j);`
- C `if b then i := j;`
- D 16a and 16c
- E all of 16a, 16b and 16c compile

17 Choose the correct constant n (represented as a decimal number) in the following equation:

$$101.11010_2 = n \times 1.0111010_2$$

- A 1
- B 2
- C 3
- D 4
- E 5

18 Given that an array of 32 elements is sorted, what is the maximum number of iterations in the loop of binary search needed to confirm that a value does *not* exist in the array?

- A 32
- B 16
- C 6
- D 5
- E 4

19

- A
- B
- C
- D
- E

20

- A
- B
- C
- D
- E