

**Final**  
21 November, 1991

This is an open book exam. You are to turn in this exam at 8:30 PM.

Name: \_\_\_\_\_

**Problem 1: 30 points**

Starting with the following type definitions and variable declarations:

```

TYPE
  CPARTS = (Intense, Red, Green, Blue) ;
  COLORS = SET OF CPARTS ;
  STR9 = ARRAY[1..9] OF CHAR ;
  CMAP = RECORD
    Name: STR9;
    Value: COLORS;
  END ;

```

```

VAR
  P: CPARTS ;
  C: COLORS ;
  S: STR9 ;
  M: CMAP ;
  B: BOOLEAN ;
  I, J: INTEGER ;
  X, Y: REAL ;

```

Which of the following 30 "phrases" is a valid Pascal statement. *Circle* your choices.

C := Red ;	B := C in M ;
I := ORD(C) ;	I := ORD(B) ;
WRITE(OUTPUT, S[3]) ;	M.Name := S[3] ;
C := C + Intense ;	I := ORD(X) ;
X + Y ;	M.Value := [ Red ] ;
P := M.Value ;	IF B THEN X := Y ;
X := I/J ;	C := C AND [ Blue ] ;
M.Name := 'C' ;	B := I in C ;
B := B AND NOT B ;	B := I <> J ;
J := ORD(S[7]) ;	C := [ P ] ;
J := SUCC(I) ;	B := B ;
B := EOLN(I) ;	I := M.Name[7] ;
X := Y * 2.0 ;	X := Ord(S) * 2.0 ;
C.Value := Green ;	B := READLN(INPUT, I) ;
Y := I ;	Y := EXP(X) ;

**Problem 2: 10 points**

Assume the following variable declarations:

VAR

```
A, B, C: CHAR ;
I, J, K: INTEGER ;
```

The following statements are executed

```
READLN( INPUT, A, B, I, J) ;
READ( INPUT, C, K) ;
```

where the INPUT file contains the following lines. (Assume each line starts with the character '5'.)

```
5 5
55 56
57 58
59 60
```

What are the values of the six variables after these statements are executed?

```
A =          B =          C =
I =          J =          K =
```

**Problem 3: 10 points**

Assume the following type definition and variable declaration

TYPE

```
IntPtr = ^ INTEGER ;
```

VAR

```
P, Q, R: IntPtr;
```

What is written to OUTPUT when the following statements are executed? (If you want partial credit, you ought to draw the pointers and the cells to which they point.)

BEGIN

```
NEW(P) ;
NEW(Q) ;
P^ := 5 ;
R := Q ;
R^ := 6 ;
WRITELN(OUTPUT, P^, Q^, R^) ;
NEW(R) ;
R^ := 7 ;
P^ := ^Q ;
IF (P = Q) THEN
  Q^ := Q^ + 10 ;
WRITELN(OUTPUT, P^, Q^, R^) ;
Q := P ;
NEW(P) ;
P^ := Q^ ;
Q^ := R^ ;
WRITELN(OUTPUT, P^, Q^, R^);
```

END

*Use your own paper for the remaining questions.*

**Problem 4: 10 points**

Write a function that converts pounds and ounces into grams. The two arguments, pounds and ounces, to the procedure are passed as Pascal INTEGERS and the result is returned as an INTEGER. Use the following constant definitions in your program:

```
CONST
    OuncesInPounds = 16;
    GramsInPounds  = 453.592 ;
```

**Problem 5: 10 points.**

Write a WHILE loop *and* associated initialization that reads all the characters of the INPUT file and the sets the character variable C to the smallest *upper-case letter* in the file. For example, if the INPUT file contained:

```
I went to see the doctor of philosophy
With a poster of Rasputin and a beard down to his knee
He never did marry or see a B-grade movie
```

Your code should set the variable C to 'B'.

**Problem 6: 10 points**

(A) Write a definition of a record type to be used for an apartment locator service. The following information should be included in your record:

```
Landlord (up to 20 characters)
Address (up to 20 characters)
Bedrooms
Price
```

(B) Write a procedure that *neatly* prints the information about one apartment stored in a variable of the record type you defined in the preceding subproblem.

**Problem 7: 10 points.**

Mr. Blaise stores the weekly quizzes for each student in his geometry class in an array of 30 integers. Each quiz is scored on a scale of 0 to 100; *however*, if a student misses a quiz, Mr. Blaise records a -1 as the "score."

Mr. Blaise computes the final score for his students as follows:

- (1) he computes average of all the quizzes the student actually took and then
- (2) he subtracts 3 points from the average for each missed quiz.

For example, a student scoring 80 on 13 quizzes and 90 on 13 quizzes and missing 4 quizzes would have a final score of 72 ( $85-4*3$ ).

Now, write a function to compute final scores for Mr. Blaise. You may start with the following:

```
TYPE
    AllScoreType: ARRAY[1..30] OF INTEGER ;

FUNCTION BlaiseScore(VAR S: AllScoreType): REAL ;
```

**Problem 8: 10 points.**

Write appropriate function and/or procedure headings *along with* associated type declarations for modules to do the following

- (A) Find the smallest element in an array of 10 integers.
- (B) Write an array of 10 integers to the terminal screen.
- (C) Find the position of the first blank in an array of 80 characters.
- (D) Compute the cube root of a real number.

Don't write any Pascal statements, just write the module headers. Your answers should look something like the type definition and function header given at the end of Problem 7.