

```
{ -- FLORIDA HIGH SCHOOLS COMPUTING COMPETITION '84 }
{ -- PASCAL PROGRAM SOLUTIONS }
```

```
{1.1}
program One1T84;
{ -- This program produces a table of Fahrenheit for Celcius. }
var
    C: Integer;

begin
    Writeln ('CELCIUS      FAHRENHEIT');
    C := 50;
    while C <= 200 do begin
        Writeln (C :3, Trunc (1.8 * C + 32 + 0.5) :11);
        C := C + 25;
    end;
end.
```

```
{1.2}
program One2T84;
{ -- This program will determine time a person slept in seconds. }
var
    H1, M1, S1, H2, M2, S2, T: LongInt;

begin
    Write ('WHAT TIME DID YOU GO TO BED (H, M, S) ');
    Readln (H1, M1, S1);
    Write ('WHAT TIME DID YOU GET UP (H, M, S) ');
    Readln (H2, M2, S2);
    T := (11 - H1) * 3600 + (59 - M1) * 60 + (60 - S1);
    Write ('YOU SLEPT FOR ');
    Writeln (T + H2 * 3600 + M2 * 60 + S2, ' SECONDS');
end.
```

```
{1.3}
program One3T84;
{ -- This program will display distance/height of a golf ball. }
var
    T, H, V: Real;

begin
    Writeln (' T      H      V'); T := 0.0;
    while (V > 0) or (T < 1) do begin
        H := 120 * T; V := 120 * T - 16 * T*T;
        Writeln (T :2:1, ' ', H: 3:0, ' ', V: 3:0);
        T := T + 0.5;
    end;
end.
```

```

{1.4}
program One4T84;
{ -- This program produces table of mice population and food. }
var
    Y, P, F: Integer;

begin
    Writeln ('NUMBER OF YEARS    POPULATION    FOOD SUPPLY FOR');
    Y := 0;  P := 10;  F := 100;
    Writeln (Y, ' ':16, P :4, F :14);
    while P < F do begin
        Inc(Y);  P := P * 2;  F := F + 40;
        Writeln (Y, ' ':16, P :4, F :14);
    end;
end.

```

```

{1.5}
program One5T84;
{ -- This program will determine time that a savings doubles. }
var
    N, P, Y: Integer;
    X:      Real;

begin
    Write ('Enter amount, % ');  Readln (N, P);
    X := N;  Y := 0;
    while X < 2 * N do begin
        X := X * (1 + P / 100);  Inc(Y);
    end;
    Writeln (Y, ' YEARS');
end.

```

```

{1.6}
program One6T84;
{ -- This program will determine name at beginning and end. }
var
    Min, Max, NM: String[10];
    I:          Byte;

begin
    Min := 'ZZZZZZZZZZ';  Max := 'AAAAAAAAAA';
    for I := 1 to 5 do begin
        Write ('Enter name: ');  Readln (NM);
        if NM < Min then Min := NM;
        if NM > Max then Max := NM;
    end;
    Writeln ('NAME CLOSEST TO BEGINNING: ', Min);
    Writeln ('NAME CLOSEST TO END: ', Max);
end.

```

```

{1.7}
program One7T84;
{ -- This program will determine longest run of heads of tosses. }
var
    N, H, Max, I: Integer;

begin
    Randomize;
    Write ('N: '); Readln (N);
    H := 0; Max := 0;
    for I := 1 to N do
        if Random(2) = 1 then Inc(H)
        else
            if H > Max then begin
                Max := H; H := 0; end
            else
                H := 0;
        If H > Max then Max := H;
        Writeln (Max, ' CONSECUTIVE HEADS');
    end.

```

```

{1.8}
program One8T84;
{ -- This program will display numbers with 7s zapped. }
var
    I, T, O: Byte;

begin
    for I := 1 to 100 do begin
        T := I div 10; O := I - T * 10;
        if ((T = 7) or (O = 7)) and (I mod 7 = 0) then
            Write ('ZAPZAP' :16)
        else if (T = 7) or (O = 7) then
            Write ('ZAP': 16)
        else
            Write (I :16);
        end;
        Writeln;
    end.

```

```

{1.9}
program One9T84;
{ -- This program will print the # of double letters. }
var
    C, LastC: Char;
    A:        String[60];
    D, I:     Byte;

begin
    Write ('Enter text: '); Readln (A); D := 0;
    for I := 1 to Length(A) do begin
        C := A[I];
        if C = LastC then Inc(D);
        LastC := C;
    end;
    Writeln (D);
end.

```

```

{1.10}
program One10T84;
{ -- This program will display sevens multiplication facts. }
var
    I, Ans, W: Byte;

begin
    for I := 0 to 9 do begin
        W := 0;
        repeat
            Write (I, ' X 7 = '); Readln (Ans);
            if Ans <> I * 7 then
                if W = 0 then W := 1 else begin
                    Writeln (I * 7);
                    W := 2;
                end;
        until (I * 7 = Ans) or (W = 2);
    end;
end.

```

```

{2.1}
program Two1T84;
{ -- This program will print number of vowels in text. }
var
  A:   String[60];
  C:   Char;
  I, V: Byte;

begin
  Write ('Enter text: '); Readln (A);
  for I := 1 to Length (A) do begin
    C := A[I];
    if C in ['A', 'E', 'I', 'O', 'U'] then
      Inc(V);
    end;
  Writeln (V, ' VOWELS');
end.

```

```

{2.2}
program Two2T84;
{ -- This program sorts rational numbers in increasing order. }
var
  N, M, I, J, S: Integer;
  Nst, Mst, Xst: String[7];
  X: Real;
  V: Array [1..9] of Real;
  A: Array [1..9] of String[7];

begin
  Write ('Enter N, M: '); Readln (N, M); S := 0;
  while (N > 0) and (M > 0) do begin
    Inc(S);
    Str (N, Nst); Str (M, Mst);
    A[S] := Nst + '/' + Mst; V[S] := N / M;
    Write ('Enter N, M: '); Readln (N, M);
  end;
  for I := 1 to S-1 do
    for J := I+1 to S do
      if V[I] > V[J] then begin
        X := V[I]; V[I] := V[J]; V[J] := X;
        Xst := A[I]; A[I] := A[J]; A[J] := Xst;
      end;
    for I := 1 to S do Writeln (A[I]);
  end.

```

```

{2.3}
program Two3T84;
{ -- This program displays #s that sum of cubes of digits= #. }
var
    I, J, K, Num: Integer;

begin
    for I := 1 to 9 do
        for J := 0 to 9 do
            for K := 0 to 9 do begin
                Num := I*100 + J*10 + K;
                if Num = I*I*I + J*J*J + K*K*K then Writeln (Num);
            end;
        end;
    end.

```

```

{2.4}
program Two4T84;
{ -- This program will print a triangle of #s by an algorithm. }
var
    N, J, I, X: Integer;

begin
    Write ('Enter # of rows: '); Readln (N);
    for I := 1 to N do begin
        Write (' ': N-I+1);
        for J := I to 2*I - 1 do
            Write (J mod 10);
        for J := 2*I - 2 downto I do
            Write (J mod 10);
        Writeln;
    end;
end.

```

```

{2.5}
program Two5T84;
{ -- This program will display a page of multiplication drills. }
uses Crt;
var
    I, H, V, X, Y: Byte;

begin
    Randomize; ClrScr;
    Writeln ('      MULTIPLICATION DRILL');
    for I := 1 to 6 do begin
        H := (I - 1) div 3; V := I - H * 3; H := H * 20 + 1;
        X := Random(90) + 10; Y := Random(9) + 1;
        GotoXY (H, V*5); Write (I, '. ', X);
        GotoXY (H, V*5+1); Write (' X ', Y);
        GotoXY (H, V*5+2); Write (' ----');
    end;
end.

```

```

{2.6}
program Two6T84;
{ -- This program will simulate throwing darts. }
var
    N, X, Y, I, J, S: Byte;
    A: Array [1..5, 1..5] of Byte;

begin
    Randomize; Write ('Enter N: '); Readln (N); S := 0;
    for I := 1 to 5 do
        for J := 1 to 5 do
            A[I, J] := 0;
        for I := 1 to N do begin
            X := Random(5) + 1; Y := Random(5) + 1; A[X, Y] := 1;
        end;
        for I := 1 to 5 do begin
            for J := 1 to 5 do
                if A[I, J] = 1 then begin
                    Write ('* '); Inc(S); end
                else
                    Write ('. ');
            Writeln;
        end;
        Writeln ('NUMBER OF THROWS = ', N);
        Writeln ('NUMBER OF SQUARES HIT = ', S);
    end.

```

```

{2.7}
program Two7T84;
{ -- This program will determine if text is palindrome. }
var
    A, S: String[80];
    L, I: Byte;
    C: Char;

begin
    Write ('Enter text: '); Readln (A);
    S := '';
    for I := 1 to Length(A) do begin
        C := A[I];
        if (C >= 'A') and (C <= 'Z') then S := S + C;
    end;
    L := Length(S);
    for I := 1 to L div 2 do
        if Copy(S, I, 1) <> Copy(S, L - I + 1, 1) then begin
            Writeln ('NOT PALINDROME'); Exit;
        end;
    Writeln ('PALINDROME');
end.

```

```

{2.8}
program Two8T84;
{ -- This program will display the frequency of letters. }
var
  A: String[60];
  B: Array[1..26] of Byte;
  L, I, X, T:      Byte;
  C:               Char;

begin
  Write ('Enter sentence: '); Readln (A);
  L := Length(A);  T := 0;
  for I := 1 to 26 do B[I] := 0;
  for I := 1 to L do begin
    C := A[I];
    if C in ['A' .. 'Z'] then begin
      X := Ord(C) - Ord('A') + 1;  Inc(B[X]);  Inc(T);
    end;
  end;
  Writeln ('LETTER    FREQUENCY    PERCENT');
  for I := 1 to 26 do
    if B[I] > 0 then begin
      Write (Chr(I + 64), ' ':8, B[I], ' ':11);
      Writeln (Round (B[I] / T * 100));
    end;
  Writeln ('TOTAL ', T);
end.

```

```

{2.9}
program Two9T84;
{ -- This program will print the longest word in sentence. }
var
  A, W, Max: String[80];
  I, L:      Byte;
  C:         Char;

begin
  Write ('Enter sentence: '); Readln (A);  A := A + ' ';
  L := Length (A);  Max := '';  W := '';
  for I := 1 to L do begin
    C := A[I];
    if C <> ' ' then
      W := W + C
    else begin
      if Length(W) > Length(Max) then Max := W;
      W := '';
    end;
  end;
  Writeln (Max);
end.

```



```

{2.10}
program Two10T84;
{ -- This program will play rock, scissors, and paper. }
var
    A:          Char;
    X, T, L, W: Byte;

begin
    Randomize;
    Write ('Enter R, S, P, or Q: '); Readln (A);
    W := 0; L := 0; T := 0;
    while A <> 'Q' do begin
        X := Random (3);
        if (X = 0) and (A = 'R') then begin
            Inc(T); Writeln ('TIE'); end
        else if (X = 1) and (A = 'S') then begin
            Inc(T); Writeln ('TIE'); end
        else if (X = 2) and (A = 'P') then begin
            Inc(T); Writeln ('TIE'); end
        else if (X = 0) and (A = 'P') then begin
            Inc(W); Writeln ('YOU WIN'); end
        else if (X = 1) and (A = 'R') then begin
            Inc(W); Writeln ('YOU WIN'); end
        else if (X = 2) and (A = 'S') then begin
            Inc(W); Writeln ('YOU WIN'); end
        else begin
            Inc(L); Writeln ('I WIN');
        end;
        Write ('Enter R, S, P, or Q: '); Readln (A);
    end;
    Writeln (T, ' TIES');
    Writeln (W, ' WINS (YOURS)');
    Writeln (L, ' LOSSES (MINE)');
end.

```

```

{3.1}
program Thr1T84;
{ -- This program will display a random trail of asterisks. }
{ -- However, the program description is poorly worded and
  ambiguous. The judging criteria is also poorly described. }
uses Crt;
var
  A: Array [1..24, 1..80] of Byte;
  I, J, V, H, X, Y:      Byte;
  Ch:                    Char;
  SameRun:               Boolean;

begin
  Randomize;
  repeat
    ClrScr;
    for I := 1 to 24 do
      for J := 1 to 80 do A[I,J] := 0;
    V := 12; H := 40; A[V, H] := 1;
    GotoXY (H, V); Write ('S'); SameRun := True;

    while SameRun do begin
      repeat
        X := Random(4)
      until (X - 2 <> Y) and (Y - 2 <> X);
      if X = 0 then Dec(H);
      if X = 2 then Inc(H);
      if X = 1 then Dec(V);
      if X = 3 then Inc(V);
      if (A[V,H] = 1) or (V = 0) or (V = 23) or (H = 0) or (H = 80)
      then begin
        GotoXY (1, 22);
        Write ('THE MAXIMUM DISTANCE FROM START = ');
        Writeln (Abs(40 - H) + Abs(12 - V));
        Ch := ReadKey; SameRun := False;
      end
      else begin
        A[V, H] := 1; GotoXY (H, V); Write ('*'); Y := X;
      end;
    end; { -- while }
  until Ch = 'Q';
end.

```

```

{3.2}
program Thr2T84;
{ -- This program will decode a message with frequent letters. }
const
  B: String[12] = 'ETAOINSHRDLU';
var
  Ast, Bst: Array [0..32] of Char;
  A:        Array [1..32] of Byte;
  Mes:      String[32];
  I, J, K,
  L, S, G:  Byte;

begin
  Write ('Message: '); Readln (Mes);  L := Length(Mes);
  for I := 1 to L do begin
    Ast[I] := Mes[I];  A[I] := 0;
  end;
  Ast[0] := ' ';  G := 0;  S := 0;
  for I := 1 to L do begin
    K := 0;
    while (Ast[K] <> Ast[I]) and (K <= I-1) do Inc(K);
    if K = I then begin { -- Found 1st occurrence of letter }
      for J := I to L do
        if Ast[I] = Ast[J] then Inc(A[I]);
      if A[I] > G then G := A[I];
    end;
  end;
  { -- Replace letters in message }
  for I := G downto 1 do begin
    J := 1;
    while (A[J] <> I) and (J <= L) do Inc(J);
    if J <= L then begin
      Inc(S);
      for K := J to L do
        if Ast[K] = Ast[J] then Bst[K] := B[S];
    end;
  end;
  for I := 1 to L do Write (Bst[I]);
  Writeln;
end.

```

```

{3.3}
program Thr3T84;
{ -- This program will produce the digital product root. }
var
    I:          Byte;
    Nst, N, X: LongInt;

begin
    Write ('ORIGINAL VALUE (1 TO 7 DIGITS): '); Readln (Nst);
    Writeln (Nst);
    while Nst > 9 do begin
        N := 1;
        for I := 1 to trunc(ln(Nst) / ln(10)) + 1 do begin
            X := Nst - (Nst div 10) * 10;
            if X > 0 then N := N * X;
            Nst := Nst div 10;
        end;
        Writeln (N); Nst := N;
    end;
end.

```

```

{3.4}
program Thr4T84;
{ -- This program will display twin primes. }
var
    N, I, J, T: Integer;
    Prime:      Boolean;

begin
    Write ('Enter N: '); Readln (N);
    Writeln ('TWIN PRIMES NOT GREATER THAN ', N);
    for I := 3 to N - 2 do begin
        J := 2; Prime := True;
        while (J <= Trunc(Sqrt(I))) and Prime do begin
            If I mod J = 0 then Prime := False;
            Inc(J);
        end;
        if Prime then begin
            T := I + 2;
            J := 2;
            while (J <= Trunc(Sqrt(T))) and Prime do begin
                if T mod J = 0 then Prime := False;
                Inc(J);
            end;
            if Prime then Writeln (I, ' ', T);
        end;
    end;
end.

```

```

{3.5}
program Thr5T84;
{ -- This program will print subsets of m people. }
var
  A:   Array [1..26] of Byte;
  Ast: Array [1..26] of Char;
  I, M, L, N, S:      Byte;

begin
  Write ('INPUT NUMBER, CAPACITY: '); Readln (L, M);
  for I := 1 to M do A[I] := M - I + 1;
  for I := 1 to L do Ast[I] := Chr(64 + I);
  N := 1; Dec(A[1]); S := 0;
  while N <= M do begin
    Inc(A[N]);
    if N > 1 then
      for I := N-1 downto 1 do A[I] := A[I+1] + 1;
    if A[N] <= L - N + 1 then begin
      for I := M downto 1 do Write (Ast[A[I]]);
      Write(' ': 16 - M);
      Inc(S); N := 0;
    end;
    Inc(N);
  end;
  Writeln;
  Writeln ('THERE ARE ', S, ' SUBSETS');
end.

```

```

{3.6}
program Thr6T84;
{ -- This program will display histogram of letter frequency. }
uses Crt;
const
  B: Array [1..5] of String[50] =
    ('THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG.',
     'THIS IS AN EXAMPLE OF HOW',
     'TO TEST YOUR HISTOGRAM PROGRAM. YOU',
     'CAN USE THIS EXAMPLE.',
     '*END*');
var
  A:   Array [1..26] of Byte;
  I, J, X, G: Byte;

```

```

begin
  ClrScr;
  for I := 1 to 26 do A[I] := 0;
  J := 1; G := 0;
  while B[J] <> '*END*' do begin
    for I := 1 to Length(B[J]) do begin
      X := Ord(B[J, I]) - Ord('A') + 1;
      if (X >= 1) and (X <= 26) then
        Inc(A[X]);
      if A[X] > G then G := A[X];
    end;
    Inc(J);
  end;
  for I := G downto 1 do begin
    for J := 1 to 26 do
      if A[J] >= I then begin
        GotoXY (J, G - I + 1); Write ('*');
      end;
    Writeln;
  end;
  for I := Ord('A') to Ord('Z') do Write (Chr(I));
  Writeln;
end.

```

```

{3.7}
program Thr7T84;
{ -- This program will display a repeating decimal. }
var
  Re: Array [1..100] of Integer;
  N, D, X, I, J, R: Integer;
  A, Xst: String[100];

begin
  A := ''; I := 0;
  Write ('Enter N, D: '); Readln (N, D);
  Write (N, '/', D, ' = '); X := N div D;
  if X > 0 then Write (X);
  Write ('.');
  repeat
    Inc(I); R := N - D * X;
    if R = 0 then begin
      Writeln (A); Exit;
    end;
    Re[I] := R; N := R * 10; X := N div D;
    { -- Display decimal if remainder repeats itself }
    for J := 1 to I - 1 do
      if Re[J] = R then begin
        Write (Copy(A, 1, J-1), '(');
        Writeln (Copy(A, J, I-J), ')'); Exit;
      end;
    Str (X, Xst);
    A := A + Xst;
  until R = 0;
end.

```

```

{3.8}
program Thr8T84;
{ -- This program will print # of round numbers less than N. }
var
    I, J, K, L, M, N, S, T, X, Pow: Integer;

begin
    Write ('INPUT NUMBER: '); Readln (N); T := 0;
    for I := 2 to N do begin
        M := I; S := 0; K := Trunc(Ln(M) / Ln(2) + 0.01);
        for J := K downto 0 do begin
            Pow := 1;
            for L := 1 to J do Pow := Pow * 2;
            X := M div Pow;
            S := S + X; M := M - X * Pow;
        end;
        if S + S = K + 1 then Inc(T);
    end;
    Write ('THERE ARE ', T);
    Writeln (' ROUND NUMBERS LESS THAN OR EQUAL TO ', N);
end.

```

```

{3.9}
program Thr9T84;
{ -- This program will provide automated price increases. }
const
  A: Array [1..3] of String[50] =
    ('THE CURRENT COST OF BUCKLES IS',
     '3 FOR $2.50, OR $10.00 A DOZEN.',
     '*END*');
var
  I, J, K, L, X, Per, Code: Integer;
  Xst: Char;
  P, T: Real;

begin
  Write ('Enter %: '); Readln (P); P := P / 100;
  K := 1;
  while A[K] <> '*END*' do begin
    L := Length (A[K]); I := 0;
    repeat
      Per := 0;
      while (I < L) and (Xst <> '$') do begin
        Inc(I); Xst := A[K , I]; Write (Xst);
      end;
      if Xst <> '$' then Writeln
      else begin
        J := I; X := 50;
        while (J < L) and ((Xst = '.') or ((X > 47) and (X < 58)))
          and (Per < 2) do begin
          Inc(J); Xst := A[K , J]; X := Ord(Xst);
          if Xst = '.' then Inc(Per);
        end;
        Val (Copy(A[K], I+1, J-I-1), T, Code);
        T := T + T * P; T := Round(T * 100) / 100;
        Write (T: 4:2);
        I := J - 1;
      end;
    until I >= L;
    Inc(K);
  end;
end.

```



```

{3.10}
program Thr10T84;
{ -- This program will simulate tennis sets between 2 players. }
var
    N, P, A, B, AG, BG, W, L: Integer;

begin
    Randomize; A := 0; B := 0; AG := 0; BG := 0; W := 0; L := 0;
    Write ('NUMBER OF SETS = '); Readln (N);
    Write ('% CHANCE A WINS A POINT= '); Readln (P);
    repeat
        if Random(100) < P then Inc(A) else Inc(B);
        if (A > 3) and (A > B + 1) then begin
            Write ('A'); Inc(AG); A := 0; B := 0;
        end;
        if (B > 3) and (B > A + 1) then begin
            Write ('B'); Inc(BG); A := 0; B := 0;
        end;
        if (AG > 5) and (AG > BG + 1) then begin
            Writeln (' (A)'); Inc(W); AG := 0; BG := 0;
        end;
        if (BG > 5) and (BG > AG + 1) then begin
            Writeln (' (B)'); Inc(L); AG := 0; BG := 0;
        end;
    until W + L = N;
    if W > L then
        Writeln ('PLAYER 'A' WON ', W, ' SETS OUT OF ', N)
    else
        Writeln ('PLAYER 'B' WON ', L, ' SETS OUT OF ', N);
end.

```