There are no examples below of What Does This Program Do using string operations. Please see the examples in the Intermediate and Junior Division files found on this CD.

1. **10-11 C1 What Does This Program Do?**

   What is printed when this program is run? Note $A \uparrow B = A^B$
   ```
   A = 2: B = 4: C = 1: D = 3: E = 5
   IF A * D >= B * E THEN A = D ELSE B = E
   IF B – C < E – D THEN C = C + A ELSE D = D + E
   IF A * B + C = B * D + E THEN E = A + B ELSE A = D + E
   IF A ↑ B > C ↑ D THEN E = E + A ELSE E = E + B
   IF ((A < B) AND (C < D)) THEN B = D ELSE A = D
   IF B/2 = INT(B/2) THEN B = B / 2 ELSE B = B + 1
   IF ((A+C > D) OR (B+C < E)) THEN A = C + D ELSE B = A + E
   PRINT A * B + C * D - E
   END
   ```

2. **10-11 C2 What Does This Program Do?**

   What is the final value of S after this program is executed?
   ```
   S = 0
   FOR I = 1 TO 12
           FOR J = 1 TO SQR(I)
                   IF I/J = INT(I/J) THEN S=S+1
           NEXT J
   NEXT I
   PRINT S
   END
   ```

3. **11-12 C1 What Does This Program Do?**

   What is printed when this program is run?
   ```
   A = 2: B = 10: C = 5: D = 20
   IF A * B = D THEN A = 2 * A ELSE B = 2*B
   C = C + 1
   IF B * C > A * D THEN B = B + 2 ELSE C = C – 2
   D = B – A
   IF B/A > D/C THEN D = 3 + A ELSE A = 4 * A
   IF B^C > 0 THEN B = B – 4
   IF ((A>B) AND (C>D)) THEN C = C + D
   D = D – A
   IF ((A<D) OR (C>B)) THEN D = D – 1 ELSE D = D + 1
   PRINT A*B/(C+D)
   END
   ```

4. 11-12 C3 What Does this Program Do?

Given the array at the right, what is the output when this program is executed?

```
for i = 1 to 4
        for j = 1 to 3
                a(i, j)=abs(a(i, j)−a(i, j + 1))
                if a(i, j)/2 = int(a(i, j)/2) then a(i, j)=0 else a(i, j)=a(i, j)+1
                if a(i, j)/4 = int(a(i, j)/4) then a(i, j)=0 else a(i, j)=a(i, j) + 1
                if a(i, j)^.5 = int(a(i, j)^.5) then a(i, j)=0 else a(i, j)=a(i, j)*a(i, j)
        next j
next i
c = 0
for i = 1 to 4
        for j = 1 to 4
                if a(i, j) != 0 then c = c + 1
        next j
next i
print c
end
```

5. 12-13 C1 What Does this Program Do?

What is printed when this program is run?

```
a = 10 : b=5 : c=20 : d=1 : e=2
if a + b > c / e then b = a - b else c = c * e
if a / b = c / b then a = b + 2 * e else d = b ^ 2
if (a > b) and (c > d) then e = d / b else b = a + c / e
if (a + c > d * e) or (b / c = b / (2 * a))  then b = a - e else c = b - c
if (a < b) or (c < d) and (b + e = a) then  d = d - c else c = c / a
print c / (b + e) – d ^ 2 + a / e
end
```

6. 12-13 C3 What Does this Program Do?

How many of the entries are not 0 after this program is run?

```
dim a(100)
for i = 2 to 25
        a(i)=i
next i
for k = 2 to 25
        if a(k) != 0  then
                for j = 2*k to 25 step k
                        a(j)=0
                next j
        end if
next k
```

7. 13-14 C1 What Does this Program Do?

What is printed when this program is run?

```
a = 10 : b = 8 : c=2 : d=-1 : e=0
if (a+2)/(b-2)= c then a = a + b
if a + c - 8 < e then c = c + b else e = e + b
if b*c > d^2*e/b then d = d * c else d = d * d
if a + c + d = b + e then c = a - d else b = a + b / 2
if e - d != a + c then e = e / c else c = c ^ e
if (a>b) and (b>c) then a = b - c
if c / 2 = int (c / 2) then c = c / 2
print (b + d) / e + ( a + e) / b + c
end
```

8. 13-14 C3 What Does this Program Do?

How many of the entries are not zero after this program is run?

```
for a = 1 to 4
        for b = 1 to 4
                c(a,b)=a*b-2*a
        next b
next a
for a = 1 to 4
        for b = 1 to 4
                if c(a,b)<0 then c(a,b)=0
                if c(a,b)/2=int(c(a,b)/2) then c(a,b)=c(a,b)/2
                if c(a,b) < 3 then c(a,b) = 0
        next b
next a
end
```

9. 14-15 C1 What Does this Program Do – Loops

What is printed when this program is run?

```
a = 48: b = 12: c = 0: d = -2: e = 3
if a/b = b/e then a = b/e
if a - b <= e^4 then b = e + c
if d*e < 0 then d = d * d else e = e * e
if a/d = int(a/d) then a = a/d else c = d - b
if ((b+c<d*e) or (a*b > e*c))then d = b - a else c = e - a+ c
print a*(b+c)/e-b^e-c/(d+1)
end
```

10. 14-15 C3 What Does this Program Do – 2D Arrays

Given array A below, what is printed when this program is run?

```
s = 0
for i = 1 to 4
        for j = 1 to 4
            A(i,j)=A(i,j)+i*j+A(j,i)
        next  j
next i
for i = 1 to 4
        for j = 1 to 4
                if A(i,j)/2!=int(A(i,j)/2) then A(i,j) =A(i,j) + 1
                if A(i,j)/2=int(A(i,j)/2) then A(i,j)=A(i,j)/2
                if A(i,j)>s then s = A(i,j)
        next j
next i
print s
end
```

4	3	9	7
9	2	7	5
1	0	6	8
4	1	2	3

A(1,2) = 1, the bottom row is accessed first

11. 15-16 C1 What Does this Program Do

What is printed when this program is run?

```
a = 16: b = 2: c = 4: d = 0: e = 5
if a < b then a = a + b else a = a - b
if a * d < c * e then a = a + d else c = c + e
if b ^ d = 1 then d = d + 1 else b = b + 1
if int(a / c) = a / c then a = a / c else a = a - c
if (a < e) or (b >= d) then a = e else b = d
if (b >= c) and (d <= e) then c = b - c else d = a - e
print a ^ d + b * e / a – c * (a / e + b ^ b)
end
```

12. 15-16 C3 What Does this Program Do – Branching

Given array A below, what is printed when this program is run?

```
s = 0
for i = 1 to 4
        for j = 1 to 4
            a(i,j)=a(i,j)-a(j,i)
        next j
next i
for i = 1 to 4
        for j = 1 to 4
            if a(i,j)>= 10 then a(i,j)=a(i,j)-10
            if a(i,j)/2=int(a(i,j)/2) then a(i,j)=a(i,j)/2
            if abs(a(i,j)) < 5 then a(i,j) = 0
        next j
next i
for i = 1 to 4
        for j = 1 to 4
            if a(i,j)=0 then s = s + 1
        next j
next i
print s
end
```

2	6	0	-1
-3	4	-2	3
0	3	-1	-4
8	2	-3	0

$A(1,2) = 6$