CornellX: ENGRI1210x The Computing Technology Inside Your Smartphone

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CONTROL STRUCTURES: IF

0:00 / 4:31 **1.0x**

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1. CHECK YOUR UNDERSTANDING (1/1 point)

Compare the following two pieces of C code:

```
z = 0;               z = 0;
if (x = y)           if (x == y)
  z = x++;             z = x++;
```

If `x` = 1 and `y` = 2, what would be the value of `z` after executing the code on the left versus on the right?

- ○ Left: 0, Right: 0
- ○ Left: 1, Right: 1
- ● Left: 2, Right: 0 ✓
- ○ Left: 3, Right: 1

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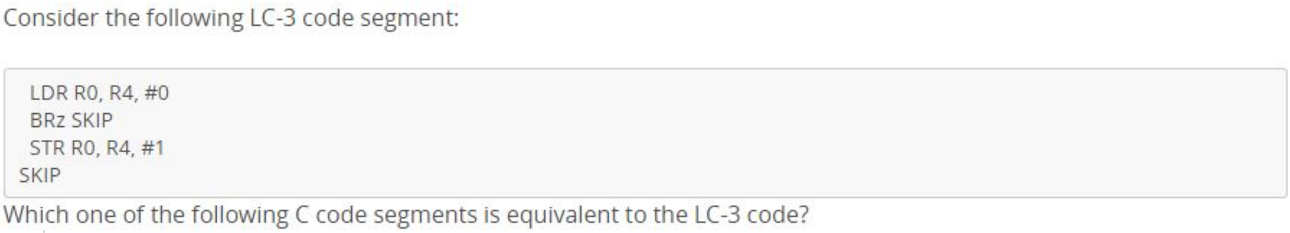
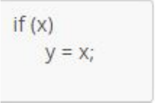
2. CHECK YOUR UNDERSTANDING (1/1 point)



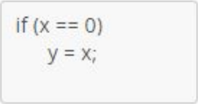
Consider the following LC-3 code segment:

```
 LDR R0, R4, #0
 BRz SKIP
 STR R0, R4, #1
SKIP
```

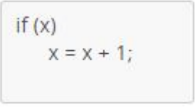
Which one of the following C code segments is equivalent to the LC-3 code?

●  ✓

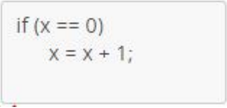
```
if (x)
    y = x;
```

○ 

```
if (x == 0)
    y = x;
```

○ 

```
if (x)
    x = x + 1;
```

○ 

```
if (x == 0)
    x = x + 1;
```

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CONTROL STRUCTURES: IF-ELSE

0:00 / 3:17

1.0x

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At 3:20 and 5:31, the highlighted line should be ADD R0, R0, R2.

CONTROL STRUCTURES: FOR

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0:00 / 6:06 1.0x

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3. CHECK YOUR UNDERSTANDING (1/1 point)

Consider the following C code segment:

```
for (i = n; i >= 0; i--);
    n = n + i;
```

Notice that the programmer accidently put a semicolon after the `for` statement. That means that the next statement `(n = n + i)` is not part of the loop body, and will only execute after the `for` loop completes.

Which of the following LC-3 assembly language programs implements this C segment?

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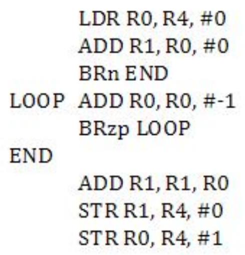
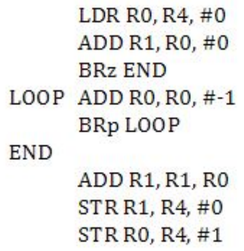
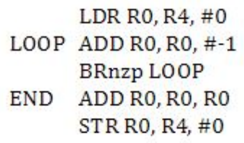
●  ✓

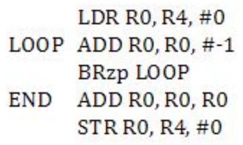
```
      LDR R0, R4, #0
      ADD R1, R0, #0
      BRn END
LOOP  ADD R0, R0, #-1
      BRzp LOOP
END
      ADD R1, R1, R0
      STR R1, R4, #0
      STR R0, R4, #1
```

○ 

```
      LDR R0, R4, #0
      ADD R1, R0, #0
      BRz END
LOOP  ADD R0, R0, #-1
      BRp LOOP
END
      ADD R1, R1, R0
      STR R1, R4, #0
      STR R0, R4, #1
```

○ 

```
      LDR R0, R4, #0
LOOP  ADD R0, R0, #-1
      BRnzp LOOP
END   ADD R0, R0, R0
      STR R0, R4, #0
```

○ 

```
      LDR R0, R4, #0
LOOP  ADD R0, R0, #-1
      BRzp LOOP
END   ADD R0, R0, R0
      STR R0, R4, #0
```

EXPLANATION

The first code is correct. The LDR loads the value of n from memory into R0, which will be used for `i`. Since `n` needs to be retained for the last C statement, the ADD instruction transfers the data from R0 into R1. If that transfer results in the `n` bit being set, then `n` < 0 and the loop is skipped entirely. Otherwise, the next ADD instruction decrements `i`, and the BRzp instruction will cause another iteration to be executed so long as `i` >= 0. The first ADD after the loop performs the statement `n = n + i` using the value of `n` in R1 and the value of `i` in R0. The next two STR instructions store the updated values of n and i.

The second code segment has the wrong nzp designations for the BR instructions.

The last two code segments fail to retain `n` and instead perform `i = i + i` after the loop and overwrite `n` with `i` .

Final Check | **Save** | Hide Answer | *You have used 1 of 2 submissions*

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