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Programming Language and Compiler Design,
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Exercise 1

We consider adding the two following expressions to the **While** language.

- **b ?** e_1 **:** e_2 is a ’conditional’ arithmetic expression. Its value is that of e_1 is b evaluates to true, and that of e_2 otherwise.
- **for x in** e_1**..**e_2 **do S**, the for statement (we suppose **x** is declared before we encounter this statement).

Give the corresponding code generation functions.

Exercise 2

We consider the following piece of code:

```
proc p() is
  begin
  var z;

  proc p1() is
  begin
  proc p2(x,y) is z:=x+y;

  z:=0;
  call p2(z+1,3);
  end;

  proc p3(x) is
  begin
  var z;

  call p1();
  z:=z+x;
  end;

  call p3(42);

  end;
```

1. Draw the execution stack at the moment procedure $p2$ is called.
2. Give the code generated for procedure $p2$.
3. Give the code generated for procedure $p1$.

Exercise 3

We consider the following piece of code:

```
proc p() is
  begin
  var x;

  proc p1(a) is
    begin
    var x1;

    proc p2(b,c) is
      begin
      var x2;
      x2:=c;
      x:=x1+x2+b;(*)
      end;

    x1:=a;
    call p2(x+1,a); (**)
    x:=2;
    end;

  x:=0;
  p1(5);
  end;
```

1. Draw the content of the execution stack when *p*2 is called.
2. Give the code generated for line (**).
3. Give the code generated by line (*).