EECS 665 – Compiler Construction – Fall 2017
Quiz – 9

Name: Prasad Kulkarni Lab Time: _____

1. **(1 point) Choose only one:** Have you completed the (online) class evaluation?
   (a) Yes
   (b) No, but I will complete it soon

1 point

2. **(2 points) Select all that apply:** *Run-time stack management* invoked during code generation, does the following:
   (a) generates code to allocate/deallocate space on the stack when entering/leaving a function
   (b) generates code to save/restore callee-save registers used by the function
   (c) assigns temporaries to machine registers
   (d) determines the size of the activation record for each function

3. **(3 points)** The following RTLs show ARM code, a three-address load/store (RISC) architecture. Apply the instruction selection optimization to these RTLs. Show all (two) steps.

1		r[12] = 20;	
2		r[14] = 4;	
3	{2}	r[8] = r[13] + r[14];	r[14]:
4	{3,1}	M[r[8]] = r[12];	r[14]:r[12]:

Step1: Combine 3 and 2

1		r[12] = 20;	
3		r[8] = r[13] + 4;	
4	{3,1}	M[r[8]] = r[12];	r[14]:r[1

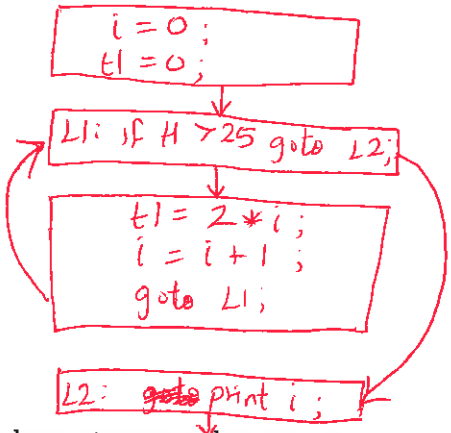
Step2: Combine 4 and 3, 4 and 1

3	r[8] = r[13] + 4;	
4	M[r[13]+4] = 20;	r[14]:

Cannot eliminate #3 since r[8] is not given to be dead.

4. **(2 points)** Partition the code below into basic blocks. Show the control-flow graph.

```
        i = 0;
        t1 = 0;
L1:     if t1 > 25 goto L2;
        t1 = 2 * i;
        i = i + 1;
        goto L1;
L2:     print i;
```



5. **(2 points)** Our runtime uses the *reference counting* heap storage reclamation strategy. Consider a program with two pointers, 'P' and 'Q'. 'P' points to an object that has 'm' total references to it. 'Q' points to an object that has 'n' total references.
   How does the statement `P = Q;` affect the reference counters, 'm' and 'n'?

Before:

After: P=Q;