Q1.
3.1
4 + 5 + 11 + 4 + 3 + 3 + 2 + 1 + 1 + 1 + 2 = 37 Cycles

3.2
```
fld      f2, 0(Rx)
Stall
Stall
Stall
fmul.d  f2, f0, f2
Stall
Stall
Stall
Stall
fdiv.d  f8, f2, f0
fld      f4, 0(Ry)
Stall
Stall
Stall
fadd.d  f4, f0, f4
Stall
Stall
Stall
Stall
Stall
fadd.d  f10, f8, f2
fsd      f4, 0(Ry)
addi    Rx, Rx, 8
addi    Ry, Ry, 8
sub     x20, x4, Rx
bnz     x20, Loop
Stall
```

Total = 27 Cycles

3.5
```
fld      f2, 0(Rx)
fld      f4, 0(Ry)
sub     x20, x4, Rx
addi    Rx, Rx, 8
fmul.d  f2, f0, f2
Stall
Stall
Stall
Stall
fdiv.d  f8, f2, f0
fadd.d  f4, f0, f4
Stall
Stall
Stall
Stall
Stall
Stall
Stall
fsd      f4, 0(Ry)
fadd.d  f10, f8, f2
bnz     x20, Loop
addi    Ry, Ry, 8
```

Total = 22 Cycles

3.6

```
b.) Using extra registers/renaming
fld     f2, 0(Rx)
fld     f4, 0(Ry)
fld     f11, 8(Rx)
fld     f12, 8(Ry)
addi    Rx, Rx, 16
fmul.d  f2, f0, f2
fmul.d  f11, f0, f11
fadd.d  f4, f0, f4
sub     x20, x4, Rx
fdiv.d  f8, f2, f0
fdiv.d  f13, f2, f0
Stall
fsd     f4, 0(Ry)
Stall
Stall
Stall
Stall
Stall
Stall
Stall
fadd.d  f10, f8, f2
bnz     x20, loop
addi    Ry, Ry, 16
```

Total = 23 Cycles

c.)
Regular = 44 Cycles
Unrolling = 23 Cycles
Speedup = 44/23 = 1.913

3.11
a.) 4
b.) 2
c.) 0

Q2.
a.)

INDEX:	1	2	3	4	5	6	7	8	9	10	11	12	13
GIVEN:	T	T	N	T	N	T	T	T	T	N	T	T	N
Predicted:	N	T	T	N	T	N	T	T	T	T	N	T	T
Missed:	1	0	1	1	1	1	0	0	0	1	1	0	1

= 8 missed predictions

b.)

INDEX:	1	2	3	4	5	6	7	8	9	10	11	12	13
GIVEN:	T	T	N	T	N	T	T	T	T	N	T	T	N
Predicted:	T	T	T	T	T	T	T	T	T	T	T	T	T
Missed:	0	0	1	0	1	0	0	0	0	1	0	0	1

= 4 missed predictions