Question:

Fill out the table. Assume 4% unconditional branch, 6% conditional branch-untaken, 10% conditional branch-taken

Scheduling scheme	**Branch penalty**	**CPI**	**Speedup v. unpipelined**	**Speedup v. stall**
Stall pipeline	3	1.60	3.1	1.0
Predict taken	1			
Predict not taken	1			
Delayed branch	0.5			

Answer:

Using the formula:

$$\text{Pipeline Speedup} = \frac{\text{Pipeline Depth}}{1 + (BranchFreq * BranchPenality)}$$

We can derive the values needed.

Scheduling scheme	**Branch penalty**	**CPI**	**Speedup v. unpipelined**	**Speedup v. stall**
Stall pipeline	3	1.60	3.1	1.0
Predict taken	1	1.20	4.2	1.33
Predict not taken	1	1.14	4.4	1.40
Delayed branch	0.5	1.10	4.5	1.45