

2

$$\text{a) Percentage} = \frac{30 \times 4\%}{30 \times 4\% + 2 \times 96\%} = 38.5\%$$

$$\text{b) Speedup} = \frac{30 \times 4\% + 2 \times 96\%}{(8 \times 4\% + 2 \times 96\%) \times (1 + 12\%)} = 1.24$$

$$\text{c) Speedup} = \frac{(30 \times 4\% + 2 \times 96\%) \times (1 / \text{frequency_initial})}{(8 \times 4\% + 2 \times 96\%) \times (1 / \text{frequency_enhanced})} = 1$$

$$\text{so } \frac{\text{frequency_initial}}{\text{frequency_enhanced}} = 1.3928$$

$$\text{frequency_enhanced} = 0.718 \times \text{frequency_initial}$$

$$\text{percentage_decrease} = 1 - 0.718 = 28.2\%$$

$$\text{d) Speedup} = \frac{30 \times 4\% + 2 \times 96\%}{10 \times 4\% + 2 \times 96\%} = 1.345$$

$$\text{or speedup} = \frac{1}{1 - 38.5\% + \frac{38.5\%}{30/10}} = 1.345$$

6

a) Percentage (store + load) = 26% + 10% = 36%. The application of new mode makes two instructions become one instruction and 10% of the store and load can use this new mode, therefore

$$\text{The instruction ratio} = \frac{1 - (26\% + 10\%) \times 10\%}{1} = 96.4\%$$

$$\text{b) Speedup} = \frac{1}{0.964 \times (1 + 5\%)} = 0.9879$$

the new mode is 21% lower than the original mode.