1. Fill in the blanks

|  |  |  |
| --- | --- | --- |
| **Hexadecimal** | **Decimal** | **Binary** |
| 0x7b | 123 | 01111011 |
| 0x71 | 113 | 01110001 |
| 0x3c | 60 | 00111100 |
| 0x7a | 122 | 01111010 |
| 0x8d | 141 | 10001101 |
| 0x5 | 5 | 00000101 |
| 0xef | 239 | 11101111 |
| 0x5d | 93 | 01011101 |
| 0x38 | 56 | 00111000 |
| 0x6e | 110 | 01101110 |

2. Fill in the blanks. For example, 32 bits can address 4Gigabytes of memory.

|  |  |
| --- | --- |
| **Address bits** | **Size of Memory** |
| 45 | 32 T |
| 30 | 1 G |
| 48 | 256 T |
| 27 | 128 M |
| 43 | 8 T |
| 42 | 4 Terabytes |
| 11 | 2 Kilobytes |
| 38 | 256 Gigabytes |
| 47 | 128 Terabytes |
| 22 | 4 Megabytes |

3. Calculate which machine is faster, by what factor, and by what percent

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A run time (sec)** | **B run time (sec)** | **Faster machine** | **By factor** | **By percent** |
| 3.776 | 0.944 | B | 4 | 400% |
| 0.979 | 3.916 | A | 4 | 400% |
| 0.118 | 0.118 | same | 1 | 100% |
| 0.387 | 1.935 | A | 5 | 500 |
| 1.628 | 0.407 | B | 4 | 400 |

4. Calculate the effective CPI;

|  |  |  |  |
| --- | --- | --- | --- |
| **Inst Class** | **A** | **B** | **C** |
| CPI | 2 | 1 | 4 |
| Proportion | 1/4 | 1/2 | 1/4 |

2 \* .25 + 1 \* .5 + 4 \* .25 = 2

5. Order the machines from fastest to slowest:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Machine** | **Instructions** | **CPI** | **Clock (GHz** | **Exec Time** |
| A | 1800 | 1.4 | 3.6 | 7\*10^-7 |
| B | 2000 | 2.3 | 1 | 4.6 \* 10^-6 |
| C | 1900 | 1.2 | 1.9 | 1.2 \* 10^-6 |
| D | 1200 | 2.8 | 1.2 | 2.8 \* 10^-6 |

Formula: Exec Time = (Instructions \* CPI) / (Clock \* 10^9)

a\_\_\_\_ c\_\_\_ \_\_\_\_d\_\_ \_b\_\_\_\_\_

(fastest) (slowest)

6. If a problem is 90% parallelizable. How many processors are needed to speed up the problem by a factor of 5?

5 = 1 / (.1 + (.9/x)) x = 9

7. If a problem is 80% parallelizable, what is the maximum speedup that can be obtained (with infinite processors)?

x = 1 / (.2 + (.8/infinite)) = 5

8. What percent of a problem must be parallelizable so that 10 processors would speed up the problem by a factor of 4?

4 = 1 / (ser + (par / 10)) = par = 83.4%