Homework 1

* Fill in the blanks

|  |  |  |
| --- | --- | --- |
| **Hexadecimal** | **Decimal** | **Binary** |
| 0x7d | 125 | 01111101 |
| 0xe6 | 230 | 11100110 |
| 0xe3 | 127 | 11100011 |
| 0x16 | 22 | 00010110 |
| 0x3a | 58 | 00111010 |
| 0xaf | 175 | 10101111 |
| 0x1 | 1 | 00000001 |
| 0x2d | 45 | 00101101 |
| 0x2e | 46 | 00101110 |
| 0x83 | 131 | 10000011 |

2. Calculate the overall MTTF of the following system:

|  |  |
| --- | --- |
| **Component** | **MTTF** |
| RAID System | 6 Million hours |
| Server Board | 3 Million hours |
| Power Supply | 500,000 hours |
| Network Interface Card | 8 Million hours |
| Cooling Fan | 400, 000 hours |

1/(1/6000000 + 1/3000000 + 1/500000 + 1/8000000 + 1/400000) = 195121.95 MTTF(system)

3. Calculate the MTTF of two redundant disk drives where the MTTF is 1.2 million hours and the MTTR is 20 hours.

(1200000^2/(2\*20)) = 36,000,000,000 MTTF(pair)

4. Calculate the effective CPI;

|  |  |  |  |
| --- | --- | --- | --- |
| **Inst Class** | **A** | **B** | **C** |
| CPI | 3 | 2 | 4 |
| # Instructions | 480 | 640 | 320 |
| Proportion | 3/9 | 4/9 | 2/9 |

3\*(3/9) + 2\*(4/9) + 4\*(2/9) =

Overall CPI = \_\_\_\_\_\_\_2.7777\_\_\_\_\_\_

5. The table below shows execution times (in seconds) of a program on two machines. Calculate which machine is faster, by what factor, and by what percent.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Machine A** | **Machine B** | **Which is faster?** | **By Factor** | **By Percent (0.1%)** |
| 1.307971 | 1.721145 | A | 1.316 | 131.6% |
| 1.22175 | 2.087343 | A | 1.710 | 171.0% |
| 0.500306 | 2.587857 | A | 5.173 | 517.3% |
| 3.710749 | 2.982973 | B | 1.244 | 124.4% |
| 3.90917 | 3.867584 | B | 1.011 | 101.1% |

6.Fill in the blanks. For example, 32 bits can address 4Gigabytes of memory. Be sure that your numbers for size of memory are powers of 2, i.e., 32 MB. Do not calculate 2^32

|  |  |
| --- | --- |
| **Address bits** | **Size of Memory** |
| 16 | 64 Kilobytes |
| 20 | 1 Megabyte |
| 18 | 256 Kilobytes |
| 23 | 8 Megabytes |
| 19 | 512 Kilobytes |
| 21 | 2 Megabytes |
| 22 | 4 Megabytes |
| 27 | 128 Megabytes |
| 43 | 8 Terabytes |
| 12 | 4 Kilobytes |

7. Order the machines from fastest to slowest:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Machine** | **Instructions** | **CPI** | **Clock (GHz)** | **Exec Time** |
| A | 2000 | 1.6 | 4 | 8\*10^-7 |
| B | 1200 | 2.1 | 1.2 | 2.1\*10^-6 |
| C | 1700 | 2.4 | 3.4 | 1.2\*10^-6 |
| D | 2000 | 2.1 | 1.4 | 3\*10^-6 |

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

\_\_\_a\_\_\_ \_\_\_c\_\_\_ \_\_\_b\_\_\_ \_\_\_\_d\_\_

(fastest) (slowest)