Computer System Design Test #1 Note Sheet

RS 232

Signal Levels:
- **Standard:**
  - High Voltage (Space/False): 3 $\leftrightarrow$ 20V
  - Low Voltage (Mark/True): -3 $\leftrightarrow$ -20V
- **TTL:**
  - High Voltage (True): 3.3V or 5V
  - Low Voltage (False): 0V

Waveforms:
- Start bit $\rightarrow$ a single 0
- Data bits $\rightarrow$ 5-9 bits, LSB first
- Parity bit $\rightarrow$ 0-1 bits, even/odd/none/etc.
- Stop bits $\rightarrow$ 1 or more bits, can be fractional

Handshaking:
- **Hardware:**
- RTS $\rightarrow$ output from DTE, indicates ready to communicate
- CTS $\rightarrow$ input to the DTE, indicates DCE is ready to communicate
- **Software:** XON $\rightarrow$ 0x11, XOFF $\rightarrow$ 0x13

UART:
- **8250:**
  - **Registers:**
    - Line Control Register
      - LCR0-1: Data bits (5-8)
      - LCR2: Stop bits (1/1.5-2)
      - LCR3: Parity Enable
      - LCR4: Odd/Even Parity
      - LCR5: Stick Parity
      - LCR6: Break control
      - LCR7: Divisor Latch Access Bit
    - DLM, DLL: Divisor Latch MSB/LSB
  - **Programming:**
- **Building a UART:**

Clocks:
- **Asynchronous:**
- **Synchronous:**

Duplex:
- **Full:** Both directions at the same time
- **Half:** Both directions at different times
- **Simplex:** Only one direction

Bit rate vs. Data rate: Bit rate == baud rate, for data rate, you need to take overhead into account

Parity: Make the # of 1s in a message even or odd

ASCII: SP $\rightarrow$ 0x20, 0 $\rightarrow$ 0x30, A $\rightarrow$ 0x41, a $\rightarrow$ 0x61

MARK time (1): Low Voltage on RS232

SPACE time (0): High Voltage on RS232

Clock Skew: Deviation in average frequency

Clock Jitter: Slight variation from period to period

DTE: Data terminal equipment, typically a PC (host)

DCE: Data circuit terminating equipment (data sink)

Crossover cable: Needed when plugging 2 DTEs together. Cross over RX/TX, RTS/CTS, DTR/DSR

USB 1.1

Bus Topology:

Maximum number of hops:

Differential Signaling:

Power Management:

Bus Protocol:

CRC:

Device Detection:
- **Full Speed:**
- **Low Speed:**

Packet Types Control, Bulk, Interrupt, Isochronous:

Signal Levels and Name (J, K, SE0):

NRZI:

Bit Stuffing:

Packet Format:
- **Sync:**
- **PID:**
- **Address Field:**
- **Endpoint Field:**
- **Frame Number:**
- **Data Field:**
- **CRC:**

Token Packet:

Start-of-Frame:

Data Packet:

Hand Shake Packet:

Packet Transmission Patterns:

Encoding/Decoding Packets: