

SE3910 Midterm Feedback

Problem 1.b

- ① -0.5 When determining if a system is a real-time system, focus on whether the system meets deadlines on time, rather than whether it meets them quickly.
- ② -1 A real-time system must complete by a finite deadline. A system is not real-time if it has no deadline for completion, even if it operates in real-time.
- ③ -1 Real-time is not synonymous with embedded. A real-time system must complete by a finite deadline. This is distinct from the definition of an embedded system, which is hardware- and dedicated purpose- related.
- ④ -0.5 Response, not start time, is what defines a real-time system.

Problem 1.b.

- ① -0.5 When determining whether a system is a hard real-time system, focus on meeting requirements or (even better) total system function. Don't focus on absolute cost of errors, but rather whether errors cause system to stop functioning
- ② -0.5 As with ①, focus on meeting requirements or (even better) total system. How will the system break down if the deadline is missed?
- ③ full score: Explicitly ties number of missed deadlines to a key requirement of registration
- ④ -1 The system is at least a firm real-time system. If registrar does not meet Week 1, Class 1 deadline, a requirement that all students are registered before classes start is not met. Students might not even know which class to go to, and, if repeated enough times, this could result in a failure of the mission of the school to educate students.
- ⑤ -0.5 The difference between firm and hard is how many deadlines can be missed, not the severity of the error.

Problem 2

- ① -1 Mention on-board memory or extra peripherals in microcontroller. (Don't say these are in the microprocessor.)
- ② -1.5 Both microprocessors and microcontrollers can handle interrupt-driven processes. Microcontrollers can handle more.
- ③ -1.5 Microprocessors and microcontrollers can both be multi-cored. Even the BeagleBone actually has two cores (very different from each other) inside.

Problem 6

Essentials

- GPS signal, antenna, or unit
- Embedded computer (e.g. EBB: Embedded Beagle Bone)
- Wireless from bus to server
- Server
- Wireless cellphone transmission to hand-held cellphone
- Cellphones
- Desktop computers

Nice touches

- Details of GPS (satellites, [satellite ground control](#))
- Details of embedded computer hardware (memory for self-identification, internet hardware)
- Details of internet hardware (cell towers, physical lines)
- The bus itself

Base score: 9.5/10

- ① +0.5 Including a nice touch
- ② -0.5 for each essential component that is not labeled.
- ③ -1 for each essential component that is missing
- ④ -0.5 Put connection labels in right place – on connections, not nodes.

Problems 10 and 11

- ① -0.5 If the 1024 conversion factor is not correctly applied. (See solution)
- ② -1 for each instance of multiplying instead of dividing a factor. For example, if you have a picture of size 921600 pixels, and there are 3 bytes/pixel, you should multiply 921600 ~~pixels~~ * 3 bytes/~~pixel~~. Note that the pixels cancel.
- ③ -1 Compute Mebibits/s, not MebiBytes/s for Prob 11.
- ④ -0.5 Kibi = 1024, Mebi = 1024². (Conversion to Mebi is correct)
- ⑤ -1 256 = 2⁸ values require only 8 bits = 1 byte to store
- (6) -1 Best practice: Cancel all units. You don't need framerate or bit/byte conversion when computing the size of a single frame.
- (7) -1 3 colors, 1 channel for each. (3 colors per pixel * 1 byte per color = 3 bytes per pixel)

Problem 12

① -1 Compression ratio is defined as compressed/uncompressed, not the other way around.

Problem 13a

② -0.5 Mark period on scope, interpret divisions as 0.5 ms

③ -1 Period is time to repeat signal – 4 divisions, 2 ms, (interpret divisions as 0.5 ms)

④ -1 Period and frequency are different. The period is the time, not cycles per time.

⑤ -1 Period = T is total time for a cycle, not just the down time.

Problem 13b

① -1 Effective voltage is NOT peak voltage. It is the peak voltage multiplied by the duty cycle.

② -0.5 Mark voltage on scope, interpret divisions as 1 V

③ -1 Peak-to-peak voltage is 2 divisions, 1 V (interpret divisions as 1 V)

④ -1 Part of a periodic signal is shown. Need to work with one period, not everything that shows on the screen.

⑤ -1 Period = T is total time for a cycle, not just the down time.

Problem 15

alg -1 (for each) Algebraic mistake

arith -0.5 (for each) arithmetic mistake