IQM3010 A1 Teacher marking exercise

IQM3010 Computer Science · Assessment 1 written examination · Sample 2026

STAFF STANDARDISATION MATERIAL · REVIEW BEFORE USE

Selected fictional examples for teacher standardisation. Use the current question paper and mark scheme. Mark independently before consulting the separate reference commentary. Partial extracts cannot establish a whole-script judgement.

Source binding. Prepared against pack revision 0.3. Recheck the hashes below before use if the assessment is amended.

Controlled source	SHA-256
Candidate question paper	a5ef3ea246c223 976a813cd2e86f0df502d79bde74e034 157a3183da8eaf674d
Candidate answer booklet	d0073c92c3d144b9e5c8a36 285fb44c0b3a53d8cb00cab97 965e1df82a083fe4
Staff mark scheme and AO1 map	4eb25cea6f268 803b2eaebd8a16 329 773c532e5de35 779 703c8e8ea8d7da1e72

Selected task B1

Processor roles, the fetch stage with registers and buses, volatile/non-volatile storage, an input device and two operating-system roles.

Example X

(a) The program counter stores the address of the instruction currently being executed. The control unit decodes instructions and coordinates their execution. The ALU carries out arithmetic calculations and logical comparisons.

(b) The PC address is copied to the MAR. The MAR sends that address along the address bus and a read signal travels on the control bus. The instruction is transferred from memory along the data bus to the MDR, then copied to the CIR. The PC is incremented so it holds the address for the following instruction.

(c) RAM is volatile, so it loses its contents when power is removed; secondary storage is non-volatile and retains stored data.

(d) A keyboard is an input device; it lets a user enter text and commands into the computer.

(e) The operating system manages memory and files, and provides an interface and services through which applications can use the computer's resources.

Proposed mark: _____ / 13

Creditable evidence: _____

Reason for judgement: _____

Example Y

(a) The PC stores the address of the next instruction. The CU stores the instruction being used. The ALU does calculations.

(b) The PC address is copied to the MAR. The MAR puts the address on the address bus. Memory sends the instruction on the data bus to the MDR. The MDR copies it to the accumulator. The PC then increases for the following instruction.

(c) RAM loses data when power is removed. Secondary storage also loses data unless the computer is shut down correctly.

(d) A keyboard is an input device; it sends the output to the screen.

(e) The OS manages files and runs applications.

Proposed mark: _____ / 13

Creditable evidence: _____

Reason for judgement: _____

Example Z

(a) The program counter keeps the address of the next instruction. The control unit stores data from memory. The ALU does addition and subtraction.

(b) The PC is copied to the MAR and the address is sent to memory. The instruction is then put in the CIR. The PC increases for the next instruction.

(c) RAM and an SSD both lose their contents when the power is removed.

(d) Keyboard.

(e) [No response]

Proposed mark: _____ / 13

Creditable evidence: _____

Reason for judgement: _____

Selected task C3

Time-growth comparison, space efficiency, tractability and why algorithms for the same problem can differ in efficiency.

Example X

(a) Algorithm X has lower time growth: it is linear, O(n), while Y is O(n^2). At n=10,000 the examples are 10,000 versus 100,000,000 comparisons, and as n grows n^2 rises faster than n.

(b) Space efficiency is the amount of memory or storage an algorithm requires.

(c) A problem is tractable when it can be solved within feasible time and memory limits as input grows. It is intractable when the required resources grow so much that solving larger inputs becomes impractical.

(d) Algorithms use different sequences of operations and data-handling choices, so their operation or storage growth can differ. They can still produce the same correct answer for the same problem.

Proposed mark: _____ / 10

Creditable evidence: _____

Reason for judgement: _____

Example Y

(a) X has lower time growth and is O(n). As n increases, n grows more slowly than n squared, so X needs fewer comparisons.

(b) Space efficiency is how much memory an algorithm uses. It grows faster if the algorithm is faster.

(c) A tractable problem can be solved in a reasonable time. An intractable problem is just a difficult problem.

(d) Different algorithms use different steps, so they can perform different numbers of operations.

Proposed mark: _____ / 10

Creditable evidence: _____

Reason for judgement: _____

Example Z

(a) Algorithm X is lower because it makes fewer comparisons for the example. I think both are probably O(n^2).

(b) Space efficiency means how fast the program runs.

(c) [No response]

(d) [No response]

Proposed mark: _____ / 10

Creditable evidence: _____

Reason for judgement: _____

Selected task C5

Eight-bit two’s-complement interpretation, representation of −45 and calculation of 54 - 19.

Example X

(a) 00 101 101 has signed value +45 because its most significant bit is 0, indicating a non-negative value.

(b) Invert 00 101 101 to get 11 010 010, then add 1 to get 11 010 011. Therefore −45 is 11 010 011 in eight-bit two's complement.

(c) 19 is 00 010 011; invert to 11 101 100 and add 1 to get 11 101 101. 54 is 00 110 110. I get 00 110 110 + 11 101 101 = 1 00 100 010; discarding the carry gives 00 100 010, or 34.

Proposed mark: _____ / 10

Creditable evidence: _____

Reason for judgement: _____

Example Y

(a) The signed value is +45. The most significant bit is the sign bit.

(b) Invert 00 101 101 to get 11 010 010; that is the representation of −45.

(c) 19 is 00 010 011; its inversion is 11 101 100. I did not complete the addition.

Proposed mark: _____ / 10

Creditable evidence: _____

Reason for judgement: _____

Example Z

(a) 00 101 101 is +45. The most significant bit is 0, so it is positive.

(b) Invert 00 101 101 to get 11 010 010. I am unsure what to do after that.

(c) [No response]

Proposed mark: _____ / 10

Creditable evidence: _____

Reason for judgement: _____