Bournemouth University

Academic Year: 2018/19
Duration: 2h 30m
Level: L4

Exam Name: **ZOMBIES IN POPULAR MEDIA AND MATHEMATICS**

Unit refs: **ZPMM**

INSTRUCTIONS TO CANDIDATES

See Front Page Instruction Samples document [here].
This could include information about:

If question paper needs to be handed in

Number of questions to answer

Allocation of marks

Where / how to answer questions (e.g. answer books / MCQ answer sheet etc)

Supplied materials

Permitted materials / equipment

Note, this list should be created without bullet points (hence the \item[])

This exam **must** include Exam Question Paper Checklist, available [here].

SECTION A

Answer ALL Questions

1 Zombies in films . . . . . (15)

Consider Zombies in films.

1. a) Name some films with Zombies [5]

1. b) State the average number of characters eaten by a single Zombie in "'28 Days Later"'. Use the following formula: [10]

$$\bar{x} = \frac{1}{n} \cdot \sum_{i=1}^{n} x_i$$

SECTION B

Answer Only ODD numbered questions

2 Zombie Programming ..... (20)

Consider the following code segment:

```
#include <iostream>
#include <math.h>

// Kernel function to add the elements of two arrays
__global__ void add(int n, float *x, float *y) {
  for (int i = 0; i < n; i++) y[i] = x[i] + y[i];
}

int main(void) {
  int N = 1<<20;
  float *x, *y;
  // Allocate Unified Memory  accessible from CPU or GPU
  cudaMallocManaged(&x, N*sizeof(float));
  cudaMallocManaged(&y, N*sizeof(float));
  // initialize x and y arrays on the host
  for (int i = 0; i < N; i++) x[i] = 1.0f; y[i] = 2.0f;
  // Run kernel on 1M elements on the GPU
  add<<<1, 1>>>(N, x, y);
  // Free memory
  cudaFree(x); cudaFree(y);
  return 0;
}
```

2. a) In your own words, explain:

2. a) i) Was this code produced by a Zombie? Consider the use of `__global__` . [5]

2. a) ii) How would you improve on the above code? [5]

2. b) Write a page essay on any topic you like. Appropriate use of references required. [10]

3 Zombie Algorithms . . . . . (15)

3. a) Consider the following algorithm:

Require: $n \geq 0$
Ensure: $y = x^n$
  $y \leftarrow 1$
  $X \leftarrow x$
  $N \leftarrow n$
  while $N \neq 0$ **do**
    if N is even **then**
      $X \leftarrow X \times X$
      $N \leftarrow N/2$
    else $\{N$ is odd$\}$
      $y \leftarrow y \times X$
      $N \leftarrow N - 1$
    end if
  end while

Describe in your own words the thought processes required for a Zombie to generate this algorithm. How can the promise of fresh brains serve as a motivators? [10]

3. b) Admire our institution's mighty logo:

Draw this in a manner similar to a Zombie. Coloured pens are provided. [5]

Name of Unit leader . . . . Anne Onymous
Ext No. 60000
Name of PSO . . . . . John Doe
Ext No. 60000