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University of Pretoria
Department of Industrial and Systems Engineering

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Simulation modelling **Simulasiemodellering**	**BUY 321**

Internal examiner: Prof. Johan W. Joubert
Interne eksaminator:

External examiner: Mr. Eduard Horak
Eksterne eksaminator:

Answer all questions on *clickUP*. Save early and frequently.

Beantwoord al die vrae op clickUP. *Stoor vroeg en gereeld.*

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Complete all **3** questions for **16** marks
*Beantwoord al **3** vrae vir **16** punte*

Total time: 120 minutes
Totale tyd: 120 minute

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Problem brief

A chemical compound arrives at a work station in the form of spherical balls via a chute. A Poisson distribution best describes the arrival rate with a rate parameter (lambda) of 6.3 per minute. The size of each ball varies; the diameter uniformly distributed between 150mm and 300mm.

When arriving at the bottom of the chute, an operator collects the chemical ball and moves it to the solution bath where the person adds the ball to the tub. The dimensions of the tub are 2m by 3m. Once added to the tub, the ball starts dissolving. As it dissolves, the ball reduces in size at a rate of 1mm (in its radius) per second.

You are required to build a simulation model to replicate the scenario depicted and described in the attached movie file `S02-2020.mp4` that is made available on *clickUP* as part of the assessment `S02-2020`.

Questions

`0`   1. This is strictly an individual assessment. You are welcome to access any documented material, but no communication with (any) other individuals via any mode or means. Carefully read the University's integrity statement and answer truthfully.

     2. Build a simulation model, in *AnyLogic*, using a combination of process modelling and state chart libraries. The model should run for the duration of today, 16 October 2020, from 08:00–16:00. This question in the assessment requires a file submission. Your entire model (folder) must be zipped (as a `*.zip` file, not a `*.7z` file) and submitted. Please rename the zipped file, using your student number as filename. For example, `01234567.zip`. The following aspects of the model will be assessed:

`2`   (a) The model runs to completion for the specified period.

`2`   (b) The model is scaled appropriately, both the layout and the (variable sized) items.

`2`   (c) The arrival rates are realistically inferred and depicted in the simulation model.

`2`   (d) The animation (and logic) depicts the spheres arriving in the chute, and the operator carrying them to the bath.

`2`   (e) The model animation depicts the dissolving balls accurately.

`2`   (f) The total volume of chemical compound is appropriately represented.

`2`   (g) Overal neatness and presentation of the model, including useful block names.

`2`   3. On average, what is the total volume (in m^3) of chemical compound added to the tub?

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einde van vraestel $\star\star\star$