COVID19 SIR Model
(Benin republic data)

Presented by Cyrille Haliya
The SIR in Benin republic

- The population in 2020 is **12 348 867**.
- The trace level of infection in the population is **2** people coming from abroad.
- Thus, the initial values for the population variables are:
  - $S(0) = 12\, 348\, 867$, $I(0) = 02$, $S(0) = 1$,
  - $i(0) = 8.0979089e-8$, $r(0) = 0$. 
The complete set of equations

\[
\begin{align*}
\frac{ds}{dt} &= -bs(t)i(t), \quad s(0) = 1 \\
\frac{di}{dt} &= bs(t)i(t) - ki(t), \quad i(0) = 8.0979089e - 8 \\
\frac{dr}{dt} &= ki(t), \quad r(0) = 0.
\end{align*}
\]

- Assume \( b = 1.0 \) and \( k = 0.33 \)

- The Python code lead to the following graphs:
Plotting of the solutions of equations
### Statistics COVID 19

<table>
<thead>
<tr>
<th>Dates</th>
<th>Infected</th>
<th>Active</th>
<th>Recovered</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>19/03</td>
<td>02</td>
<td>02</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23/03</td>
<td>05</td>
<td>05</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>29/03</td>
<td>06</td>
<td>06</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>01/04</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>03/04</td>
<td>16</td>
<td>14</td>
<td>02</td>
<td>0</td>
</tr>
<tr>
<td>05/04</td>
<td>22</td>
<td>17</td>
<td>05</td>
<td>0</td>
</tr>
<tr>
<td>06/04</td>
<td>25</td>
<td>19</td>
<td>05</td>
<td>01</td>
</tr>
</tbody>
</table>
CUMULATIVE CASES (Python code use for plotting)

Covid 19 data

![Graph showing cumulative cases from Covid-19 data, with lines for total infected, recovered, death, and active cases.](image)
Plotting with $b=1.0$ and $k=0.19$ (Equivalently 1 infection in 5 days)
These fitting parameters are not so realistic since the data presents some irregularities after the 1st April, the immediate increase in the number of infected people, and a low number of recovered and dead people is uncertain.
Thank You.

Cyrille E. Haliya
00233 26 948 7185
Exude.glory@gmail.com
https://www.gouv.bj/coronavirus/flashinfos/