1) The frame rate reported by the program when the window is different sizes, specifically 1x1, 300x300 and full screen. Explain your results.

At 1x1, the frame rate reported is ~60FPS.

At 300x300, the frame rate reported is ~ 60FPS.

At full screen, the frame rate reported is ~ 60FPS.

I am using macOS Sierra to run the gear program, in macOS Sierra, the Vertical Synchronization (call beam sync in macOS) is enforced and no way to disable it. This feature locks the frame rate to my display’s refresh rate (60 FPS).

Therefore, for all different window size, they all have the same frame rate. However, for more complex scenario, which reaches the limitation of my GPU, the larger size window will decrease the frame rate.

In Ubuntu (VM),

At 1x1, the frame rate reported is ~430 FPS.

At 300x300, the frame rate reported is ~130 FPS.

At full screen, the frame rate reported is ~ 17 FPS.  
  
2) On some systems the frame rate is a small round number like 60 or 72 or 85 frames per second, and sometimes it is a large number, thousands or tens of thousands of frames per second. Explain why this occurs.

Like the explanation from previous problem, it is due to the Vertical Synchronization or VSync, it locks the frame rate to the display’s refresh rate to eliminate something called tearing. Tearing is a phenomenon that gives a disjointed image.

3) Time required to complete the assignment.

~ 1 hour