**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Activity#1**

**Applied Numerical Weather Prediction Due: Wednesday, Jan. 19, 2022**

**High Frequency v. Low Frequency Atmospheric Waves**

**(1.1)** Create computer code that calculates the zonal wind component (*u*) of the following function:



over a twelve hour period, where A is equal to 10.0 m s-1, B is 1.0 m s-1, and *ω* and *ω* are 7.4x10-6  s-1, and 1.8x10-4 s-1, respectively.

Assume that this zonal wind component function represents the zonal wind observations at AVL over the twelve hour period.

**(1.2)** Plot three curves with time ‘*t*’ on the x-axis [seconds] and *u*(*t*), *A*sin(*ωt*), and *B*sin(*ωt*) on the y-axis [m s-1] every five minutes over the twelve hour period at AVL. Calculate (using computer code) and plot the local time derivative of *u*(*t*) every five minutes over the twelve hour period at AVL.

[q1.2.1] If the *A*sin(*ωt*) contribution comes from Wave A and the *B*sin(*ωt*) contribution comes from Wave B, which wave contributes most to the AVL zonal wind observation and which wave contributes most to the computed AVL zonal wind *tendency*?

[q1.2.2] Which wave (A or B) is most likely a gravity wave (small-scale) and which wave is most likely a synoptic-scale (large scale) wave? What is the logic used in formulating your answer?