Homework: pg 352 # 1 - 9, 11\*

Modeling Periodic Behaviour

Periodic behaviour describes a function that repeats.

Some examples of periodic behaviour are:

1. The outside temperature as a function of time in years.
2. The amount of daylight on a daily basis.
3. The electrical activity around the heart as viewed on an electrocardiogram (ECG).
4. The population of tent caterpillars; pattern repeats every 10 years.
5. The voltage of an AC (alternating current) electric circuit.
6. Financial stability in the market; recessions occur about once every 10 years; 1981, 1991, 2001, 2009

Periodic events are often discussed using the following key terms:

* Cycle – one repetition in a repeating process.
* Period (T) – The change in the independent variable (typically time in seconds) corresponding to one cycle.
* Frequency (f) – the number of cycles that occur per unit of the independent variable. If the independent variable is time measured in seconds then the frequency is measured in s-1 or Hz (Hertz).
* Line of Equilibrium (simply called the “axis” in the textbook) – a horizontal line that is positioned halfway up from the bottom of the graph to the top.
* Amplitude – Half of the graph’s range or the vertical distance from the line of equilibrium to the top of the graph.

**Example 1**

If the maximum temperature in Guelph is 28oC and the minimum temperature is

 –12oC each year then calculate the amplitude and the line of equilibrium:

 Amplitude $= \frac{maximum-minimum}{2}=$

 Line of Equilibrium $= \frac{maximum+minimum}{2}=$

Period and frequency are related by the equations:

 or 

**Example 2**

Determine if each graph describes periodic behaviour. If the graph is periodic, label one cycle, determine the amplitude, period, frequency and equation of the line of equilibrium.

Amplitude =

Period =

Frequency =

Equation of the line of equilibrium 🡪

a) Amount of Daylight in Balmaceda, Chile

**Amplitude =**

**Period =**

**Frequency =**

**Eqn of the Axis:**

b) A Normal ECG





Amplitude =

Period =

Frequency =

Equation of the line of equilibrium 🡪

0 v

c) Radius of Atom



Amplitude =

Period =

Frequency =

Equation of the line of equilibrium 🡪