VKT analysis

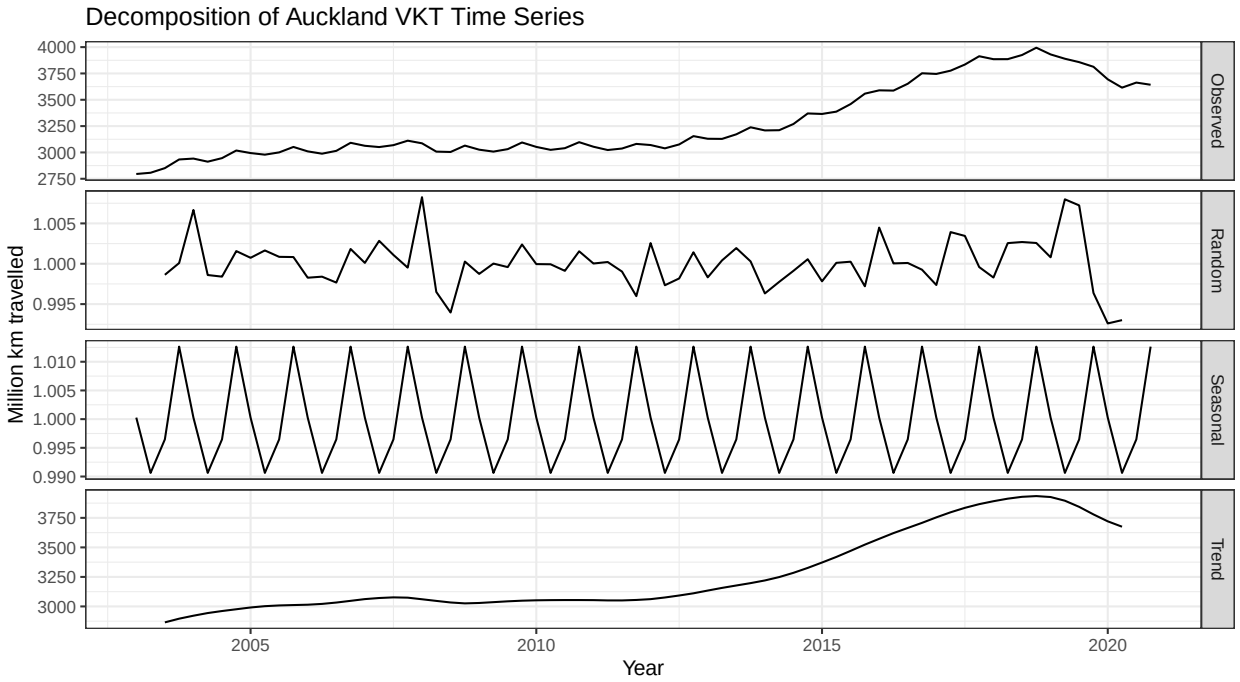
```
vkt = read.csv("downloaded_stats/VKT_main_quart.csv")
vkt_other_yearly = read.csv("downloaded_stats/VKT_other_yearly.csv")
vkt_fuel_yearly = read.csv("downloaded_stats/VKT_fuel_vehicle_type_yearly.csv")
```

```
decomp_vkt_auck = vkt[vkt$year >= 2003,3:13]$Auckland %>%
  ts(frequency = 4, start = min(2003)) %>%
  decompose("multiplicative")

plot_decomp(decomp_vkt_auck, ylab = "Million km travelled", title = "Decomposition of Auckland VKT Time
```

```
## Don't know how to automatically pick scale for object of type ts. Defaulting to continuous.
```

```
## Warning: Removed 2 row(s) containing missing values (geom_path).
```



if we make the assumption of the seasonal trend of VKT following a sin wave we can use the equation

$$y = a \sin\left(\frac{2\pi}{12}(x-b)\right) + c$$

to calculate what such sin wave would have been required to produce the quarterly "Boxes" we can adjust the parameters a, b, and c to minimize the difference in integral sum.

y would be a (sum of km)/month

(3 parameters so 3 degrees of freedom and 4 points to base off so will still be slight averaging going on)

```
a_list = seq(0,0.2,0.001)
b_list = seq(0,12,0.2)
c_list = 1
#vector order is best a,b,c values and lowest difference
best_comb = c(0,0,0,Inf)
i = 0;

season_sum = decomp_vkt_auck$seasonal[1:4]

for (a in a_list) {
  for (b in b_list) {
    for (c in c_list){
      i = i+1

    }
  }
}
print(i)
```

```
## [1] 12261
```