

STATS 326
Applied Time Series
ASSIGNMENT ONE
ANSWER GUIDE

Question One: Cycles

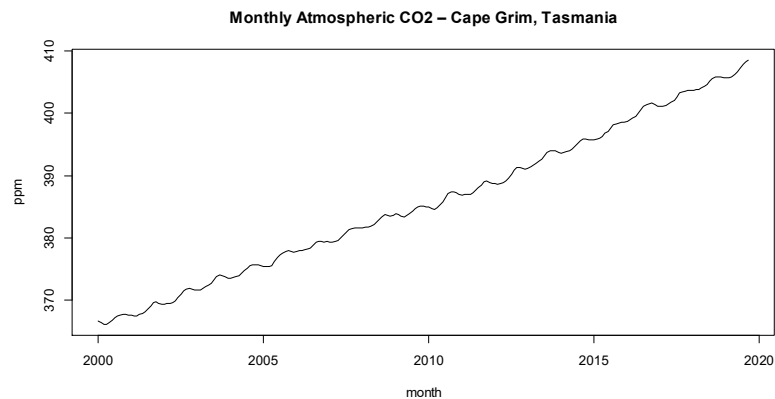
Question Two: Stationary

Question Three: Seasonal Component (no Trend or Cycle)

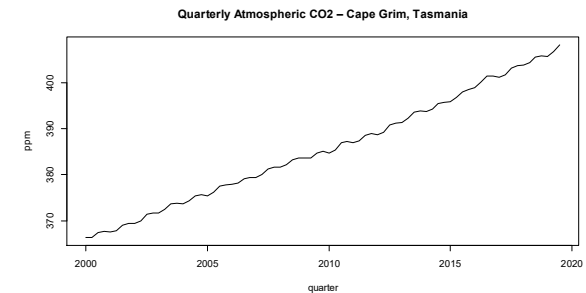
Question Four: Reasonably Linear Trend & Seasonal Component

Each of the first 4 questions are worth 20 marks each. Check the marksheet attached to your assignment.

Question 5: Cape Grim Atmospheric Data



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> full.CO2.ts = aggregate(CO2.ts,nfrequency=4,FUN="mean")
> length(full.CO2.ts)
[1] 79
> full.CO2.ts
      Qtr1      Qtr2      Qtr3      Qtr4
2000 366.3863 366.4037 367.4203 367.6973
2001 367.5207 367.9027 369.0967 369.4803
2002 369.4270 369.9707 371.3770 371.7620
2003 371.6890 372.4383 373.6807 373.7763
2004 373.6723 374.3227 375.4520 375.6280
2005 375.3920 376.2130 377.5687 377.8473
2006 377.9360 378.2100 379.1730 379.3973
2007 379.3747 380.0100 381.2467 381.6203
2008 381.7007 382.1700 383.3130 383.5863
2009 383.6957 383.6140 384.6660 385.0477
2010 384.7473 385.3163 386.9857 387.2457
2011 386.9543 387.3307 388.5190 388.9523
2012 388.6717 389.1890 390.8207 391.2057
2013 391.4060 392.3460 393.6410 393.9120
2014 393.7137 394.2803 395.5377 395.8033
2015 395.9107 396.7437 398.0460 398.5157
2016 398.9710 400.1003 401.4067 401.4010
2017 401.1900 401.7723 403.1280 403.6593
2018 403.8217 404.4143 405.5640 405.8337
2019 405.7300 406.7113 408.2467
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The series appears to have a reasonably linear trend although there appears to be a change in slope around $t = 50$.

There appears to be a seasonal pattern with quarter 3 being the highest quarterly value and quarter 1 being the lowest quarterly value once you allow for the trend, on average.

The range of the CO₂ concentration in the atmosphere, is between 366.39 and 408.25 parts per million.