ECONOMICS QUANTITATIVE SKILLS

WORKSHEET & ANSWERS

Areas covered:

- Index numbers
- Calculating, using and understanding percentages and percentage changes
- Converting money to real terms
- Averages (Mean and Weighted)
- Quantiles
- Making calculations of elasticity and interpreting the result

Answers at the back of the worksheet.

INDEX NUMBERS

1. The rate of inflation in Cameroon is shown in the table below:

Year	Price Index (2015 = 100)
2013	91
2014	103
2015	100
2016	104

(a) Calculate the rate of inflation between 2013 and 2014 to 2 decimal places.
(b) Calculate the rate of inflation in the 2-year period between 2014 and 2016, to 2 decimal places.

2. The rate of inflation in Mexico is shown in the table below:

Year	Inflation Rate	Inflation Rate Index (2015 = 100)
2013	4.2%	
2014	4.5%	
2015	4.0%	100
2016	2.5%	

Fill in the right-hand column above.

3. The following table relates to the sales of 3 car companies:

Company	2015 sales (£m)	2016 sales (£m)	Sales Index (2015 = 100)
Ford	250	252.5	
Volkswagen	240	249.6	
Toyota	170	166.6	

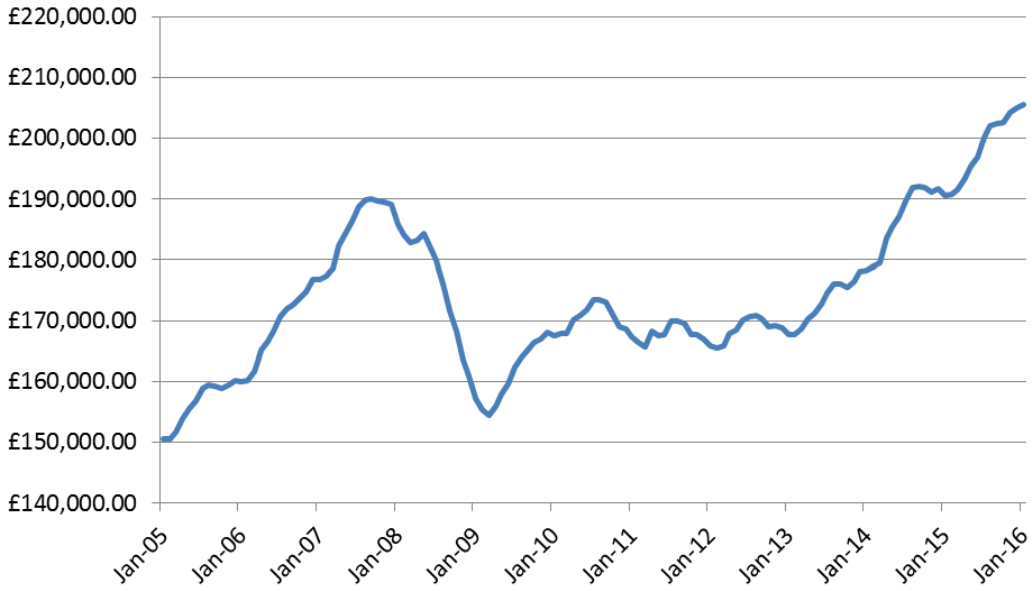
Calculate the value of an index of sales for 2016 and fill in the right-hand column above.

4. The table below shows the House price Index for 2016 and the Average House price (2016) in three UK cities:

City	House Price Index for 2016 (base = 2010)	Average House Price in 2016 (000s)	Average House Price in 2010
London	155	440	
Edinburgh	135	250	
Cardiff	115	235	

Calculate the average house price (2010) in the three cities assuming 2010 was the base year.

5. The graph below shows the average UK house price from January 2005 to January 2016:



Source: Land Registry, Registers of Scotland, Land and Property Services Northern Ireland and Office for National Statistics

(a) Calculate the percentage change in house prices Jan 2009 to Jan 2011.
(b) Calculate the percentage change in house prices Jan 2013 to Jan 2016.

6. The graph below shows the exchange rate between the pound and the dollar over the last 2 years:

Source: xe.com

(a) Calculate the percentage change in the value of the pound over the 2 years.
(b) Calculate the percentage change in the value of the pound from 1 Jan 2016 to 1 Jan 2017.

CONVERT MONEY TO REAL TERMS

7. The table below shows the Panama GDP figures 2014-16 and Price Inflation for Panama for the same years:

Panama	2014 (bn)	2015 (bn)	2016 (bn)
GDP ($)	400	440	462
Price Index (Base = 2014)	100	105	109

(a) Calculate Real GDP for 2015 (in 2014 prices).
(b) Calculate Real GDP for 2016 (in 2014 prices).

8. The table below shows the average wage of a NHS nurse 2014-16 and Price inflation for the UK during the same period:

	2014	2015	2016
Av. Wage (£)	22,950	23,100	23,300
Price Index (Base = 2014)	100	102	104

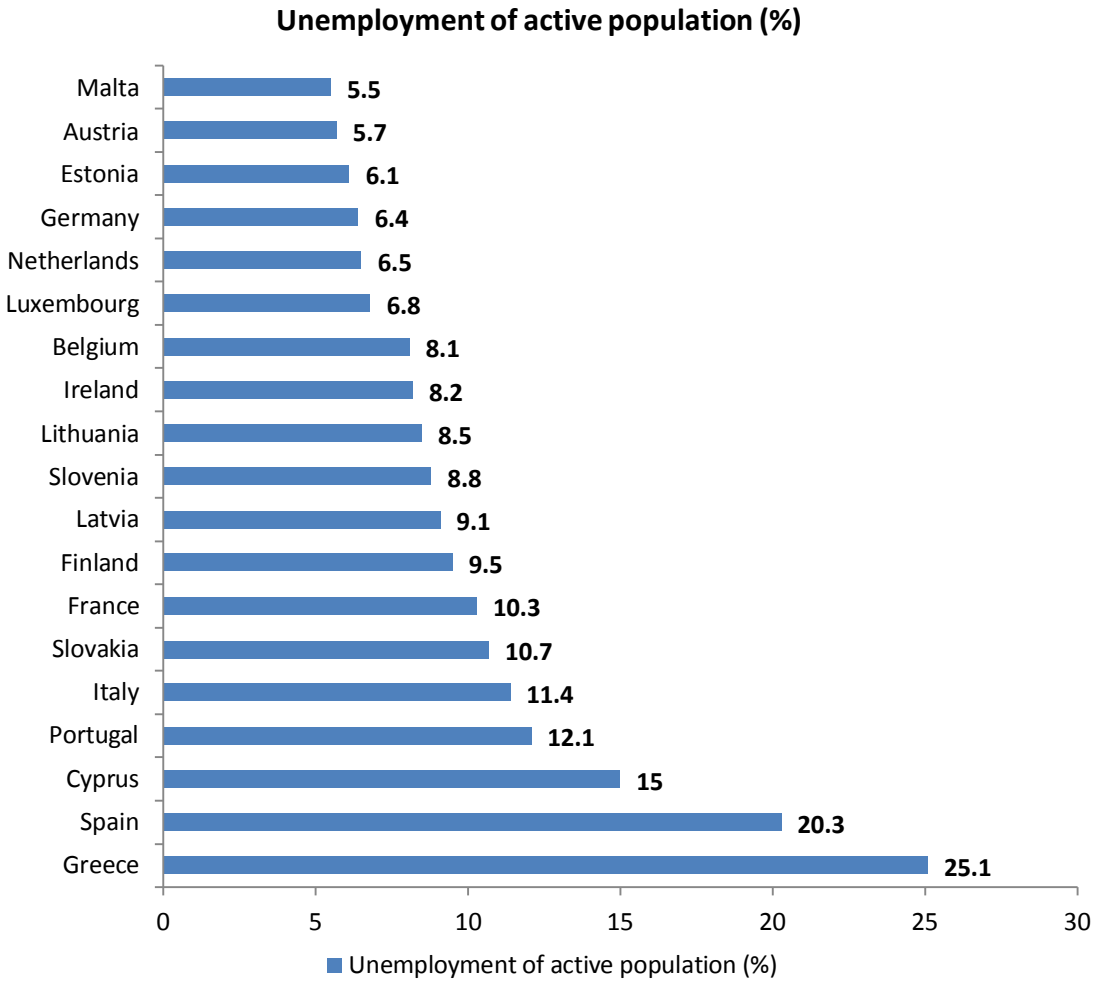
(a) Calculate the nurse's real wage in 2015 (in 2014 prices).
(b) Calculate the nurse's real wage in 2016 (in 2014 prices).

AVERAGES

9. Study the data below.

(a) What is the mean average monthly minimum wage of the top 3 countries in Asia?
(b) What is the mean average monthly minimum wage of the bottom 3 countries in Asia?
(c) Extension: Explain why cutting the monthly minimum wage is likely to lead to an improvement in a country's trade balance.

10. Study the data below.



(a) What are the mean and median averages for the (forecast) unemployment rates across these countries?
(b) Why is the mean average value higher?
(c) Why might it be more useful to use a median average rather than a mean average for this sort of data?
(d) Extension: Discuss whether supply-side policies are better than demand-side policies at reducing unemployment rates.

WEIGHTED AVERAGE

11. The inflation rate in the land of Stephonia is calculated using a small basket of just 5 goods (shirts, pens, coffee, fuel and TV subscriptions). The price changes are shown for each product below.

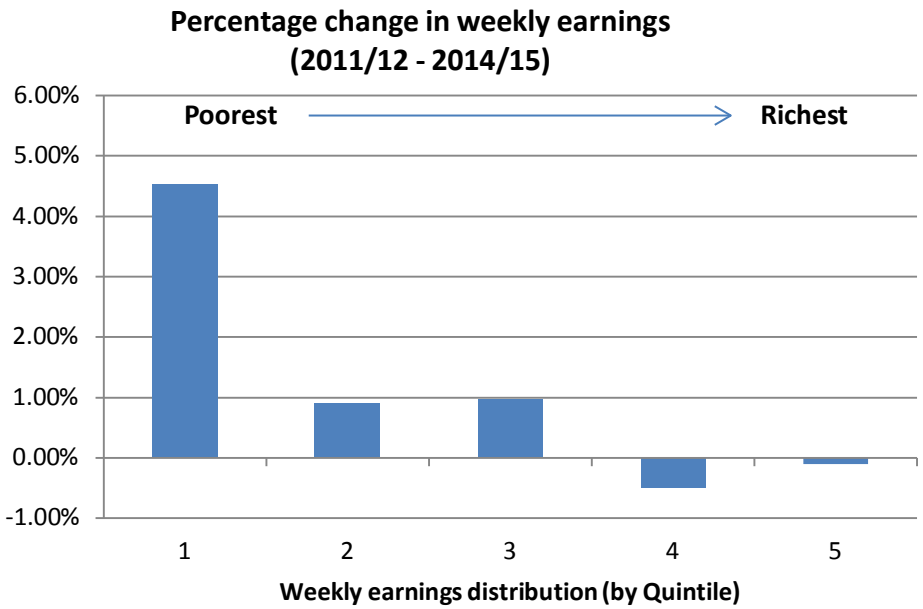
Goods	Weight	Index year 1 (year 0 = 100)	Index year 2
Shirts	200	103	111
Pens	90	102	110
Coffee	260	99	97
Fuel	300	96	101
TV subscriptions	150	104	108

(a) What was inflation during:
- (i) Year 0 to Year 1?
- (ii) Year 0 to Year 2?
- (iii) Year 1 to Year 2?

(b) Explain why the value for (i) is so small?
(c) Coffee became cheaper in Year 2, so explain why the answer to (iii) is so large?
(d) Explain why a weighted average is more useful than an unweighted average when measuring the inflation rate within a country?
(e) Extension: Discuss the extent to which inflation is always bad for an economy.

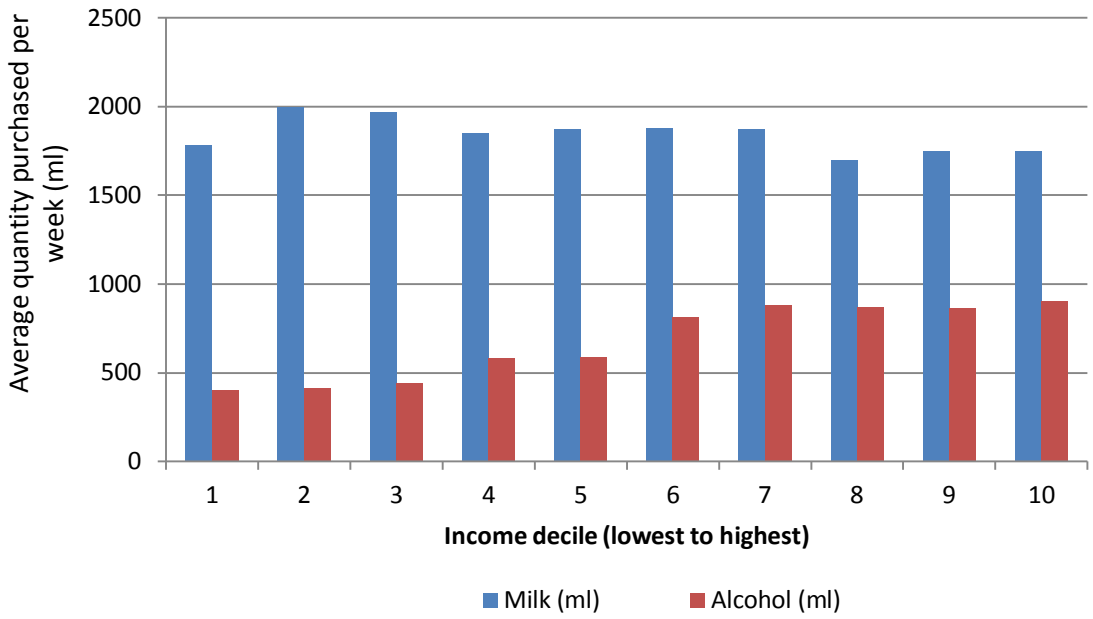
QUANTILES

12. The graph below shows the growth in weekly earnings among workers by Quintile:



(a) Explain what the impact of this will be on income inequality within the UK?
(b) "The poorest earners are always likely to see the greatest % wage growth because any pay rise in pounds is coming from a lower base". Explain this statement.

13. The graph below shows the average quantity of milk and alcohol (per week) purchased by income decile (2013):



Using the data above, compare the likely income elasticities of demand (YED) for milk and alcohol.

14. The graph below shows average annual income by income percentile in the UK (2015):

Source: Institute for Fiscal Studies

(a) Using the graph, explain why is the mean average income likely to be different to the median average income in the UK?

(b) Calculate the % difference in income between the median average income and the average income of those on the 99th percentile.

MAKE CALCULATIONS OF ELASTICITY AND INTERPRET THE RESULT

15. The table below gives estimates of PED by income group and age for alcohol consumption in the UK.

Price elasticity	low income	middle income	High income
14-17 years	-0.75	-0.65	-0.55
18-28 years	-0.50	-0.40	-0.30
29+ years	-0.35	-0.25	-0.15

Describe how and explain why PED changes according to age and income levels.

16. Product X is price elastic in demand and is an inferior good. It also has a close substitute in the form of Product Z. Possible elasticities in this case might be:

	Price elasticity of demand for X	Income elasticity of demand for X	Cross elasticity of demand between X and Y	ANSWER *Tick one box only*
A	-0.7	-0.6	-1.1	☐
B	-0.7	+0.6	+1.1	☐
C	-1.4	-0.6	-1.1	☐
D	-1.4	-0.6	+1.1	☐
E	-1.4	+0.6	-1.1	☐

QUESTIONS	ANSWERS
1(a):	13.19%
1(b):	0.97%
2:	

Year	Inflation Rate	Inflation Rate Index (2015 = 100)
2013	4.2%	91.83
2014	4.5%	95.69
2015	4.0%	100
2016	2.5%	102.5

3:

Company	2015 sales (£m)	2016 sales (£m)	Sales Index (2015 = 100)
Ford	250	252.5	101
Volkswagen	240	249.6	104
Toyota	170	166.6	98

4:

City	House Price Index for 2016 (base = 2010)	Average House Price in 2016 (000s)	Average House Price in 2010
London	155	440	283.87
Edinburgh	135	250	185.19
Cardiff	115	235	204.35

5(a):	6.4% (January 2009: £157,234, January 2011: £167,300)
5(b):	22.5% (January 2013: £167,716, January 2016: £205,457)
6(a):	-12.9%
6(b):	Approx. £1=$1.45 to $1.25 so 13.8%
7(a):	£419.05bn
7(b):	£423.85bn
8(a):	£22,647.06
8(b):	£22,403.85 (check these?)
9(a):	$833/month
9(b):	$100/month
9(c):	Cutting minimum wages leads to falling costs of production for firms. As a result, the final price of goods/services falls which makes them more competitive on world markets. Thus, exports should increase. Also lower incomes may mean fewer imports.
10(a):	Median 8.8% (Slovenia); Mean is 10.2%
10(b):	Because it is skewed by the (very) high values at the bottom of the table such as Spain and Greece.
10(c):	The median gives a more accurate picture of u/e rates in the EU. The mean is distorted.
10(d):	It depends on the type of unemployment BUT if it is cyclical unemployment,

	then demand-side policies will be more effective.

11(a):	(i)	-0.08%; (ii) +3.82% (iii) +3.9%
11(b):		Two goods (with large weightings) fell in price
11(c):		The other goods all rose in price by higher rate of inflation
11(d):		A weighted average skews the average in favour of those goods/services which consumers spend the majority of their income. Therefore, it is more accurate.
11(e):		As a general inflation (especially above target rate) is undesirable. Rapidly rising prices means that exports are non-competitive (leading to fall in AD), many households are pushed into poverty, the value of savings is eroded and there are menu costs and show-leather costs to bear in mind also. On the flip-side, inflationary pressure (at or slightly above target rate) is desirable since it gives producers an incentive to produce into the future, it allows the economy to have a buffer away from deflation and firms can put downwards pressure on wages in real terms, even if nominal wages are rising.
12(a):		Weekly earnings for the poorest quintile are rising dramatically whilst the next lowest quintiles (the 2nd and 3rd lowest) are also rising. The richest quintiles (4th and 5th) are falling. Therefore, income inequality is likely to be falling; the situation is improving.
12(b):		Because the poorest earners have much lower incomes, any increase (even a small one) will mathematically end up as a large percentage increase. Those earners with high incomes may experience the same level of wage growth as the low income earners, as a % it will be smaller.
13:		High income earners and low income earners alike seem to consume a similar amount of milk. There is very little variation between the income decile; the av, quantity purchased remains within a narrow band (approx. 1800ml to 2000ml). It could be considered income inelastic. Alcohol, however, is different. The av, quantity consumed seems to increase with income decile. Lowest income earners consume less (approx. 400ml) than half that of the highest income earners (approx. 900ml). Therefore, it could be considered an income elastic good.
14(a):		The mean average will be skewed by the higher incomes of those in the top decile (90th to 99th percentile). Therefore, the mean will be much higher than the median.
14(b):		623%.
15:		The older people are, the more price inelastic alcohol seems to be (this is true in all income groups). Presumably, this is because older people have been drinking for a longer period of time and, therefore, are more addicted. PED is more inelastic in the high income category. Presumably, this is because it is small % of income and people across income buy similar levels of alcohol.
16:		D