Sample Answers for Problem Set 1

Problem 1.

(a) The nominal GDPs for 2018, 2019, and 2020 are

$$\begin{aligned} 100 \times 1.00 + 100 \times 0.50 + 50 \times 2.00 &= 250, \\ 120 \times 2.00 + 150 \times 0.75 + 100 \times 2.50 &= 602.5, \\ 150 \times 2.50 + 200 \times 1.00 + 150 \times 3.00 &= 1025. \end{aligned}$$

The real GDPs for 2018, 2019, and 2020 are

$$\begin{aligned} 100 \times 1.00 + 100 \times 0.50 + 50 \times 2.00 &= 250, \\ 120 \times 1.00 + 150 \times 0.50 + 100 \times 2.00 &= 395, \\ 150 \times 1.00 + 200 \times 0.50 + 150 \times 2.00 &= 550. \end{aligned}$$

(b) The GDP deflators in 2019 and 2020 are

$$\text{GDP Deflator in 2019} = \frac{\text{Nominal GDP in 2019}}{\text{Real GDP in 2019}} \times 100 = \frac{602.5}{395} \times 100 \approx 152.53,$$

$$\text{GDP Deflator in 2020} = \frac{\text{Nominal GDP in 2020}}{\text{Real GDP in 2020}} \times 100 = \frac{1025}{550} \times 100 \approx 186.36.$$

The Consumer Price Indexes in 2019 and 2020 are

$$CPI_{2019} = \frac{100 \times 2.00 + 100 \times 0.75 + 50 \times 2.50}{100 \times 1.00 + 100 \times 0.50 + 50 \times 2.00} \times 100 = \frac{400}{250} \times 100 = 160,$$

$$CPI_{2020} = \frac{100 \times 2.50 + 100 \times 1.00 + 50 \times 3.00}{100 \times 1.00 + 100 \times 0.50 + 50 \times 2.00} \times 100 = \frac{500}{250} \times 100 = 200.$$

Then the inflation rates in 2019 and 202 are

$$\text{Inflation in 2019} = \frac{CPI_{2019} - CPI_{2018}}{CPI_{2018}} \times 100\% = \frac{1.6 - 1}{1} = 60\%,$$

$$\text{Inflation in 2020} = \frac{CPI_{2020} - CPI_{2019}}{CPI_{2019}} \times 100\% = \frac{2 - 1.6}{1.6} = 25\%.$$

(c)

$$CPI_{2021} = \frac{100 \times 3.0 + 100 \times 5.60 + 50 \times 7.00}{100 \times 1.00 + 100 \times 0.50 + 50 \times 2.00} \times 100 = \frac{1210}{250} \times 100 = 484$$

$$\text{Inflation in } 2021 = \frac{CPI_{2021} - CPI_{2020}}{CPI_{2020}} \times 100\% = \frac{4.84 - 2}{2} \times 100\% = 142\%$$

(d) inflation

Problem 2.

Write $u = \frac{U}{E+U}$ and $e = \frac{E}{E+U+N}$, where *E* denotes the number of the employed, *U* denotes the number of the unemployed, and *N* denotes the number of those out of the labor force. Then the labor-force participation rate is

$$\frac{E+U}{E+U+N} = \frac{\frac{1}{E+U+N}}{\frac{1}{E+U}} = \frac{\frac{E}{E+U+N}}{\frac{E}{E+U}} = \frac{\frac{E}{E+U+N}}{1 - \frac{U}{E+U}} = \frac{e}{1-u}.$$

Problem 3.
Real GDP: https://fred.stlouisfed.org/release/tables?rid=53&eid=41074#snid=41075
Nominal GDP:
https://fred.stlouisfed.org/release/tables?rid=53&eid=41047#snid=41048
Population: https://fred.stlouisfed.org/series/B230RC0A052NBEA

	Most recent year (2019)	Your birth year (1989)	Start of "Post-War Period" (1956)
Nominal GDP	$21372582 million	$5641580 million	$449353 million
Real GDP	$19032672 million	$9197997 million	$2934391 million
Population	330513000	247387000	168221000
Nominal GDP per capita (GDP / Population)	$64664.88	$22804.67	$2671.21
Real GDP per capita (GDP / Population)	$57585.24	$37180.60	$17443.67
Implied Deflator (Nominal GDP per capita / Real GDP per capita * 100)	112.29	61.33	15.31