

Econ 227: Intermediate Macroeconomics
Problem Set #1 Answers

1. Consider the following economy with a petroleum refiner, a computer factory, a government, and consumers. The refiner produces 10M million liters of refined petroleum, which sell for \$5 per liter. The factory produces 40 computers, which sell for \$500,000. Of the 10M liters of petroleum, 6M are sold to consumers, 2M are sold to the factory to power their computers, and 2M are unsold. Of the 40 computers, the refiner buys 10 to expand capacity, the government buys 20 to upgrade their surveillance technology, consumers buy 5, and the factory retains the rest. The government also spends \$5 million in wages for surveillance professionals. This is financed by \$1M in taxes from the refiner, \$2M from the factory, and \$1M from consumers. The factory and the refiner pay \$6M and \$40M in wages respectively, and the refiner pays \$5M to consumers in interest on a loan. Calculate GDP by production, expenditures, and income.

• **GDP by Production:**

- Refiner: $\$50M$
- Factory: $\$500,000 \times 40 = \$200M$
- Government: $\$5M$ (surveillance is valued at the cost of production)
- * **Total Value Added:** $\$65M$

• **GDP by Expenditures:**

- Consumption: $\$32.5M$ ($\$30M$ of petroleum and $\$2.5M$ of computers)
- Investment: $\$27.5M$ ($\$12.5M$ of inventory investment, and $\$15M$ of computers)
- Government Spending: $\$5M$
- * **Total Expenditures:** $\$65M$

• **GDP by Income:**

- Wages: $\$51M$
- Interest: $\$5M$
- Profits: $\$9M$ ($\$5M$ for the refiner, and $\$4M$ for the factory).
- * **Total Income:** $\$65M$

2. Indicate which component or components of expenditures will be changed by the following transactions, how much they'll change, and how much they'll change Lebanese GDP. Suppose that cement costs \$1M per ton.
- (a) A Lebanese cement company sells 10 tons of cement to a Lebanese construction company.
The cement is an intermediate good, so GDP doesn't change.
 - (b) A Lebanese cement company sells 10 tons of cement to a Scandinavian construction company.
GDP rises by \$10M via a rise in net exports.
 - (c) A Lebanese cement company produces 10 tons of cement but doesn't sell it this year.
GDP and inventory investment rise by \$10M.
 - (d) Next year, the Lebanese cement company sells the cement to a Lebanese construction company. Using the cement and labor, the Lebanese construction company builds an apartment building which it sells for \$20M. Workers are paid \$5M in wages.
GDP rises by \$10M. Residential investment rises by \$10M, inventory investment rises by -\$10M.
 - (e) A Lebanese cement company buys a pile driver from a Siamese pile driver manufacturer.
GDP doesn't change. Investment spending rises, and net exports falls, by the price of the pile driver.
 - (f) A Lebanese cement company pays \$1M to a Lebanese employment agency for labor services.
GDP doesn't change.
 - (g) Lebanese cement enthusiasts buy 10 tons of cement from the Lebanese cement company.
Consumption spending and GDP rise by \$10M.
 - (h) Lebanese cement enthusiasts buy 10 tons of cement from a Turkish cement company.
GDP doesn't change: consumption spending rises, and net exports falls, by \$10M.
 - (i) A Lebanese shop buys 10 tons of cement from a Turkish cement company for its inventory.

GDP doesn't change: a \$10M rise in inventory investment is offset by a \$10M drop in net exports.

- (j) The Lebanese shop sells these 10 tons of Turkish cement to Turkish tourists.

Assuming the Lebanese shop sells the cement for \$1M per ton (the same price at which it bought the Turkish cement), GDP won't change. A \$10M rise in net exports is offset by a \$10M of inventory disinvestment.