

**KSU – Chemical Engineering Department**  
**ChE 418 (Chemical Plant Economics and Safety) – TUT #7 (Economics)**

**Name:**

**ID:**

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1. Estimate the manufacturing cost per 100 kg of product under the following conditions. Use Cost Evaluation Flowsheet.  
Fixed-capital investment = \$4 million. Annual production output =  $9 \times 10^6$  kg.  
Raw materials cost = \$0.25/kg of product.  
Utilities: 800-kPa steam = 50 kg/kg of product. Purchased electric power = 0.9 kWh/kg of product. Filtered and softened water = 0.083 m<sup>3</sup>/kg of product.  
Operating labor = 12 persons per shift at \$25.00 per employee-hour.  
Plant operates three hundred 24-h days per year.  
Corrosive liquids are involved. A large amount of direct supervision is required.  
There are no patent, royalty, interest, or rent charges. Plant overhead costs amount to 50 percent of the cost for operating labor, supervision, and maintenance.
  
2. A process plant making 5000 kg/day of a product selling for \$1.75/kg has annual variable production costs of \$2 million at 100 percent capacity and fixed costs of \$700,000. What is the fixed cost per kilogram at the breakeven point? If the selling price of the product is increased by 10 percent, what is the dollar increase in net profit at full capacity if the income tax rate is 35 percent of gross earnings? Assume 8000 h/y operating time.