A businessman is considering the purchase of an asset that has an initial cost of $2,000. The salvage value for the asset in 10 years is $400. The asset promises an annual return of $600 and has operating costs of $100 the first year, $150 the second with increases of $50 in each subsequent year. These values are estimated in today's prices. The estimated cash flow is given in the diagram below.

**Assumptions regarding inflation and escalation**
The general inflation rate is 5%.
The salvage value is escalating at a 9% rate.
Returns for the project escalate at a rate of 10% per year.
The operating costs will change at the same rate as general inflation.
The businessman’s *real* MARR is 20%.

**Problem**
Except for part 10, compute numeric results with calculators or Excel. Do not use the *Economic* add-in. For the necessary formulas, see Lesson 16 -- Inflation.

1. Compute the Market MARR: ___________________
   
   *Note:* the terms Market MARR and Actual MARR mean the same thing.

**Asset Cost and Salvage**
2. Estimate the salvage value of the asset in actual dollars: ______________
3. Estimate the salvage value of the asset in real dollars: ______________
4. Write the formula for the NPW of the initial cost and salvage value using the market MARR: ___________________
Evaluate the formula: ________________

5. Write the formula for the NPW of the initial cost and salvage value using the Real MARR: ________________________

Evaluate the formula: ________________

Returns

Estimate the project returns in actual and real dollars for each of the 10 years. Compute the PW of each yearly return. Construct a table in Excel to do this efficiently. Show the results for years 1, 5 and 10.

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>5</th>
<th>10</th>
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<tbody>
<tr>
<td>Estimate</td>
<td>600</td>
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6. Find the NPW of returns for all 10 years by bringing the actual values to the present:

<table>
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<tr>
<th>Year</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tr>
<td>Estimate</td>
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<td>NPW(r)</td>
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</table>

7. Find the NPW of returns for all 10 years by bringing the real values to the present:

______________
Operating Costs

The operating costs are special in that both the uniform series and gradient components escalate at the same rate as general inflation. This makes the computation of the NPW of the operating costs simple.

8. Write the formula for the NPW of the operating costs: _______________________

   Evaluate the formula: ______________

Project Total NPW

9. Find the project total NPW by adding up the component values: ______________

10. Use the Economics add-in to define the project with the inflation option. Check your answers to problems 1 - 9. In addition:

   a. What is the NPW of the project? ______________

   b. What is the actual IRR of the project? ______________

   c. Is the project acceptable and why?______________