We now return to Pedro who is thinking of starting a tree-trimming service. He will run the service for five years and then dissolve it.

**Truck Costs**
He plans on buying three new Ford F-150 trucks for the business, which can be purchased for $24,000 each. This cost includes taxes and fees at purchase. The resale value for a truck after five years is estimated at $8000.

The following describes the annual operating costs for a single truck. Annual insurance cost is $1200 and annual license and inspection fees are $100. Maintenance cost is $400 in the first year and increase by $200 in each subsequent year. The cost of repairs is zero for the first two years and will be $200 in the third year. In subsequent years the cost will grow by $200 per year.

**Fuel Costs**
Fuel costs are $0.15/mile. In addition to job mileage, each truck will drive 2000 miles a year. The round trip to each job averages 20 miles.

**Shredders**
In addition to trucks he must purchase wood shredders. He needs one shredder that costs $5000. The shredder must be replaced at the beginning of the third year for a cost of $5000. Shredders have no resale value.

**Labor**
Each job requires two trimmers for an 8-hour day and $50 in supplies. Tree trimmers earn $15 an hour. The workers are hired hourly. Overhead (office, phone, secretary, etc.) for running the business is 40% of the trimmer labor cost. Pedro will be the manager with an annual salary $30,000.

**Demand**
The demand for lawn service is expected to be 250 jobs per year. We will investigate several assumptions regarding revenue.

**Event Form**
There is a blank form on Blackboard that will help you get started with this problem. It will be available during the class meeting.
Problems

For these problems use the Economics add-in. Use the Add Project command to create a project with one investment and 15 cash flow components. Put the initial cost and resale of the trucks in the Investment Data row. The resale value of the trucks is expressed as a percentage in the cell indicated as Salvage. Put the remainder of the cash flow components in the Cash Flow Data rows. Enter expenditures as negative numbers and revenues as positive numbers. The start time for a gradient is the first period where the cash flow is non-zero.

For parts a, b and c, find the NPW, NAW and IRR for the cash flow. Use the Compute Rates command to find the IRR for each case.

For part b, the unit revenue is not given; find the revenue per job that just yields a 15% return. (Hint: Use Solver to find the revenue that makes the Present Worth cell equal to zero when the MARR is set to 15%.)

Provide your solutions to parts a, b and c in the following table.

<table>
<thead>
<tr>
<th>Part</th>
<th>a.</th>
<th>b.</th>
<th>c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Revenue</td>
<td>$625</td>
<td>Yields 15% return</td>
<td>$650</td>
</tr>
<tr>
<td>Present Worth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Worth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision</td>
<td>(Accept/Reject)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
d. Pedro is considering a second option that involves outsourcing the jobs to a company that does not deal with the public. That company will charge Pedro $475 for each job. For this option, Pedro only needs one truck; he does not need an office, workers or supplies. Moreover, his truck requires only the fixed component of the fuel charge. Pedro will receive his $30,000 annual salary.

Evaluate this option with unit revenue of $650 per job using an MARR of 15%.

Present Worth__________ Annual Worth_________ IRR ________

e. Compare the two options described with revenue of $650 per job. The MARR is 15%. Use the Compare Projects command. The option with the smaller initial investment is the defender and the one with the greater initial investment is the challenger.

Which option should Pedro select and why?