1. Chapter 9, Problem 7
The expected utility of the individual is given by:
\[ E(u(X)) = 0.5 \pi (30;000 x 0.00001 x 30;000^2) + 0.5 \pi (40;000 x 0.00001 x 40;000^2) \]
\[ E(u(X)) = 22,500. \]
We need to solve for CE such that:
\[ u(CE) = 22,500 \]
\[ CE \cdot 0.00001 \pi CE^2 = 22,500 \]
\[ CE = 34,189 \]

2. Chapter 11, Problem 1
\[ E(PV)_2 = \left[ i \cdot 10 \pi 0.1 + 10 \pi 0.2 + 30 \pi 0.1 \right] \pi 1;000 \]
\[ E(PV)_2 = 10,000 \]
\[ Var(PV)_2 = \left[ i \cdot 10^2 \pi 0.1 + 10^2 \pi 0.2 + 30^2 \pi 0.1 \right] \pi (1;000)^2 \cdot (10;000)^2 \]
\[ Var(PV)_2 = 220;000;000 \cdot (100;000;000 \cdot 100;000;000) \]
\[ Var(PV)_2 = 120;000;000 \]

\[ E(PV)_3 = \left[ i \cdot 10 \pi 0.1 + 10 \pi 0.3 + 20 \pi 0.3 + 30 \pi 0.1 \right] \pi 1;000 \]
\[ E(PV)_3 = 11;000 \]
\[ Var(PV)_3 = \left[ i \cdot 10^2 \pi 0.1 + 10^2 \pi 0.3 + 20^2 \pi 0.3 + 30^2 \pi 0.1 \right] \pi (1;000)^2 \cdot (11;000)^2 \]
\[ Var(PV)_3 = 250;000;000 \cdot (121;000;000 \cdot 121;000;000) \]
\[ Var(PV)_3 = 129;000;000 \]

\[ E(PV)_4 = \left[ i \cdot 10 \pi 0.0 + 10 \pi 0.4 + 20 \pi 0.0 + 30 \pi 0.3 \right] \pi 1;000 \]
\[ E(PV)_4 = 13;000 \]
\[ Var(PV)_4 = \left[ (10^2) \pi 0.4 + (20^2) \pi 0.3 \right] \pi (1;000)^2 \cdot (13;000)^2 \]
\[ Var(PV)_4 = 310;000;000 \cdot (169;000;000 \cdot 169;000;000) \]
\[ Var(PV)_4 = 141;000;000 \]

\[ E(PV)_5 = \left[ (10 \pi 0.065 + 30 \pi 0.2) \right] \pi 1;000 \]
\[ E(PV)_5 = 12;500 \]
\[ Var(PV)_5 = \left[ (10^2) \pi 0.065 + (30^2) \pi 0.2 \right] \pi (1;000)^2 \cdot (12;500)^2 \]
\[ Var(PV)_5 = 245;000;000 \cdot (156;250;000 \cdot 156;250;000) \]
\[ Var(PV)_5 = 88;750;000 \]

3. Chapter 11, Problem 2
Consider only outcomes below $5,000:

Project 1:
\[ S_h = \left[ i \cdot 10 \pi 5 \right]^2 \pi 0.2 + \left[ i \cdot 5 \right]^2 \pi 0.2 \pi (1;000)^2 \]
\[ S_h = 50;000;000 \]

Project 3:
\[ S_h = \left[ i \cdot 10 \pi 5 \right]^2 \pi 0.1 + \left[ i \cdot 0 \pi 5 \right]^2 \pi 0.2 \pi (1;000)^2 \]
Sh = 27; 500; 000
Project 4:
Sh = [(0 i 5)² × 0.3] π (1; 000)²
Sh = 7; 500; 000
Project 5:
Sh = [(0 i 5)² × 0.15] π (1; 000)²
Sh = 3; 750; 000

4. Chapter 11, Problem 6

(a) Set 1
First degree test:
F (x) = (x i 2)=8; 2 <= x <= 10
G(x) = x=13; 0 <= x <= 13
G(2) = 2=13 > 0 = F (2) but G(10) = 10=13 < 1 = F (2):
Therefore there is no dominance.
Second degree test:
\[ \int_1^x F(t) \, dt = \frac{x^2}{16} + \frac{x}{4} \]
\[ \int_1^x G(t) \, dt = \frac{x^2}{26} \]
No Dominance (curves intersect)
Third degree test:
\[ \int \int F(t) \, dt = \frac{x^3}{48} + \frac{x^2}{8} + \frac{x}{4} - \frac{1}{6} \]
\[ \int \int G(t) \, dt = \frac{x^3}{78} \]
f(x) would dominate g(x) but E[g(x)] > E[f(x)], so test fails.

(b) Set 2
First degree test:
F (x) = (x i 2)=8; 0 <= x <= 23
G(x) = (x i 5)±0; 5 <= x <= 15
G(5) = 0 < 5=23 = F (5) but G(10) = 0:5 > 10=23 = F (10):
No dominance.
Second degree test:
\[ \int F(t) \, dt = \frac{x^2}{46} \]
\[ \int G(t) \, dt = \frac{x^2}{20} + \frac{x}{2} + 1:25 \]
No Dominance (curves intersect)
Third degree test
The curve for \( g \) is below that of \( f \), but we have \( E[g(x)] > E[f(x)] \): No dominance.

(c) Set 3
First degree test
\[
F(x) = (x; 1); 1 \leq x \leq 9 \\
G(x) = x; 0 \leq x \leq 11
\]
\( G(1) = 11 > 0 = F(1) \) but \( G(9) = 9 < 1 = F(9) \):
No dominance.
Second degree test:
\[
F(t) dt = \frac{x^3}{138} \\
G(t) dt = \frac{x^2}{60} + \frac{1}{25}x + 2:08
\]
No Dominance (curves intersect)
Third degree test
\[
F(t) dt = \frac{x^3}{48} + \frac{x^2}{16} + \frac{x}{16} + \frac{1}{48} \\
G(t) dt = \frac{x^3}{66}
\]
(same conclusion as in Set 2.)

(d) Set 4
First degree test
\[
F(x) = (x; 1); 0 \leq x \leq 10 \\
G(x) = (x; 2); 2 \leq x \leq 7
\]
\( G(2) = 0 < 2 = 10 = F(2) \) but \( G(7) = 1 > 7 = F(7) \):
No dominance.
Second degree test:
\[
F(t) dt = \frac{x^2}{20} \\
G(t) dt = \frac{x^2}{10} + \frac{2x}{5} + 0:4
\]
No Dominance (curves intersect)
Third degree test
\[
F(t) dt = \frac{x^3}{30} + \frac{x^2}{5} + \frac{2x}{5} + \frac{8}{30} \\
G(t) dt = \frac{x^3}{60}
\]
(same conclusion as in Set 2.)
5. Chapter 11, Problem 8

First degree test:

<table>
<thead>
<tr>
<th>PV</th>
<th>A, F(x)</th>
<th>B, G(x)</th>
<th>C, Z(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10,000</td>
<td>0.2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0.2</td>
<td>0.25</td>
<td>0.2</td>
</tr>
<tr>
<td>10,000</td>
<td>0.6</td>
<td>0.75</td>
<td>0.8</td>
</tr>
<tr>
<td>20,000</td>
<td>0.8</td>
<td>0.85</td>
<td>0.9</td>
</tr>
<tr>
<td>30,000</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

No dominance shown

Second degree test, all values in 1,000:

<table>
<thead>
<tr>
<th>PV</th>
<th>A, ∫ F(t) dt</th>
<th>B, ∫ G(t) dt</th>
<th>C, ∫ Z(t) dt</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000</td>
<td>4</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>20,000</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>30,000</td>
<td>18</td>
<td>18.5</td>
<td>19</td>
</tr>
</tbody>
</table>

No dominance shown

Third degree test, all values in 1,000:

<table>
<thead>
<tr>
<th>PV</th>
<th>A, ∫ ∫ F(t) dt</th>
<th>B, ∫ ∫ G(t) dt</th>
<th>C, ∫ ∫ Z(t) dt</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10,000</td>
<td>40</td>
<td>12.5</td>
<td>10</td>
</tr>
<tr>
<td>20,000</td>
<td>110</td>
<td>75</td>
<td>70</td>
</tr>
<tr>
<td>30,000</td>
<td>250</td>
<td>217.5</td>
<td>215</td>
</tr>
</tbody>
</table>

\[ E(PV_A) = 12,000; \ E(PV_B) = 11,500; \ E(PV_C) = 11,000 \]

No dominance shown. (means cause trouble)