1. A 100,000 fully discrete whole life insurance policy is issued to (45). You are given:

- Expenses are paid at the beginning of each year consisting of:

<table>
<thead>
<tr>
<th>% of Premium</th>
<th>Per Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year</td>
<td>20%</td>
</tr>
<tr>
<td>Renewal years</td>
<td>5%</td>
</tr>
</tbody>
</table>

- Mortality follows the Illustrative Life Table.
- $i = 6\%$

Calculate the gross annual premium.

2. For a fully continuous whole life insurance of 100 issued to ($x$), you are given:

- $\mu_{x+t} = 0.01$, for $t > 0$
- The force of interest at time $t$ is $\delta_t = \begin{cases} 0.04, & \text{for } 0 < t \leq 10, \\ 0.05, & \text{for } t > 10 \end{cases}$

Calculate the annual benefit premium.

3. For a fully continuous whole life insurance of 1 on ($x$), you are given:

- $\delta = 0.05$
- $\bar{A}_x = 0.50$
- $^2\bar{A}_x = 0.30$
- Expenses are: (a) 0.02 initial expense, and (b) 0.005 per year, payable continuously.
- The gross premium is the benefit premium plus 0.007.
- $L_0^g$ is the loss-at-issue random variable for this policy.

Calculate $\text{Var}[L_0^g]$.

4. For a 2-year term life insurance policy on ($x$), you are given:

- The benefit is 10 payable at the end of the year of death.
- The premium is payable once each year at the beginning of the year.
- The expenses are 0.40 at policy issue and 0.10 at the beginning of the second year.
- $q_x = 0.05$
- $q_{x+1} = 0.08$
• $i = 5\%$

Calculate the gross annual premium.

5. For a special fully discrete whole life insurance on (50), you are given:
   • The benefit is 200,000 if death occurs for years 1 to 10 and reduces to 150,000 if death occurs thereafter.
   • The annual benefit premium is $P$ for years 1 to 10, $0.75P$ for years 11 to 20, and 0 thereafter.
   • Mortality follows the Illustrative Life Table.
   • $i = 6\%$

Calculate $P$.

6. For a fully discrete whole life insurance of 1000 on (40), you are given:
   • The annual premium is 11.35.
   • Mortality follows the Illustrative Life Table.
   • $i = 6\%$
   • $L_0$ is the loss-at-issue for this policy.

Calculate $\Pr[L_0 > 200]$.