Module 5 Section 3 Exercises:

1. For a fully discrete whole life par insurance of 100,000 on (30), you are given:
   (i) Actuarial assumptions follow the ILT
   (ii) Dividends are 80% of profit in all years, paid as reversionary bonuses
   (iii) The profit emerging during year 10 for a policy in force at time 9 is 500

   Determine
   (a) the share of profits paid at the end of year 10 per policy in force at time 9
   (b) the insurer's surplus emerging at time 10, after payment of dividends, per policy in force at time 9
   (c) the bonus at the end of year 10 assuming dividends are returned in the form of reversionary bonuses
   (d) the simple reversionary bonus rate at the end of year 10

2. For a fully discrete whole life insurance of 10,000 on (40), you are given:
   (i) $A_{40} = 0.26, A_{41} = 0.28, A_{42} = 0.30, A_{43} = 0.36, \text{ and } A_{44} = 0.40$
   (ii) Dividends are 90% of profit in all years starting with year 2, paid as reversionary bonuses (no dividend is paid in year 1)
   (iii) The profits emerging at time $t, Pr_t$, for a policy in force at time $t - 1$ are:

   \[ Pr_0 = -1200 \text{ (the pre-contract expense)}, \quad Pr_1 = 1400, \quad Pr_2 = 250, \quad Pr_3 = 400, \quad Pr_4 = 500 \]

   Determine, for policies in force at the appropriate times,
   (a) the dividends paid at times 1, 2, 3, and 4
   (b) the bonuses paid at times 1, 2, 3, and 4
   (c) the simple reversionary bonus rates at times 1, 2, 3, and 4
   (d) the compound reversionary bonus rates at times 1, 2, 3, and 4