Nonlinear Programming

Use Excel to find the optimal solution to the following nonlinear problems:

1. Maximize $\text{profit} = 28\,X_1 + 21\,X_2 + 0.25\,X_2^2$

   Subject to $X_1 + X_2 \leq 1{,}000$

   $0.5\,X_1 + 0.4\,X_2 \leq 500$

   $X_1, X_2 \geq 0$

2. Maximize $\text{profit} = \$13\,X_1 + \$6\,X_1X_2 + \$5\,X_2 + \$1/X_2$

   Subject to $2\,X_1^2 + 4\,X_2 \leq 90$

   $X_1 + X_2^3 \leq 75$

   $8\,X_1 - 2\,X_2 \leq 61$

   $X_1, X_2 \geq 0$

3. Minimize $\text{costs} = \$5\,X_1 + \$7\,X_2$

   Subject to $3\,X_1 + 0.25\,X_1^2 + 4\,X_2 + 0.3\,X_2^2 \geq 125$

   $13\,X_1 + X_1^3 \geq 80$

   $0.7\,X_1 + X_2 \geq 17$

   $X_1, X_2 \geq 0$