Figure 1: The Troll-II oil and natural gas platform located in the North Sea.

The Troll-II oil platform (see Figure 1) began producing oil in 1996.

The Troll-II oil field is now one of Norway's largest, accounting for approximately 10% of Norway's annual petroleum production. The platform is the largest concrete structure of its kind - certainly the largest concrete structure ever moved.

- **The oil production data[1] for Troll-II for the year 2000 is given in Table 1 and Figure 2 below. Use this data to estimate the total amount of oil produced by Troll-II during 2000.**

Date	Production Rate
1/1/2000	46.105
2/1/2000	49.785
3/1/2000	46.246
4/1/2000	49.633
5/1/2000	49.024
6/1/2000	49.658
7/1/2000	51.953
8/1/2000	51.438
9/1/2000	48.178
10/1/2000	51.955
11/1/2000	52.875
12/1/2000	48.532

Table 1: Production data for the Troll-II oil field. (Source: Norwegian Petroleum Directorate, `www.npd.no`)
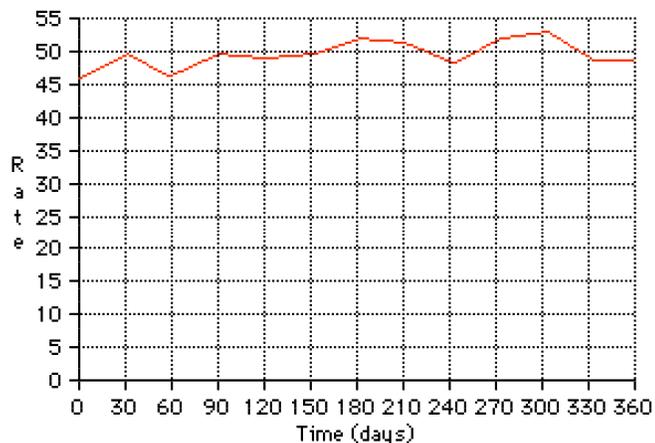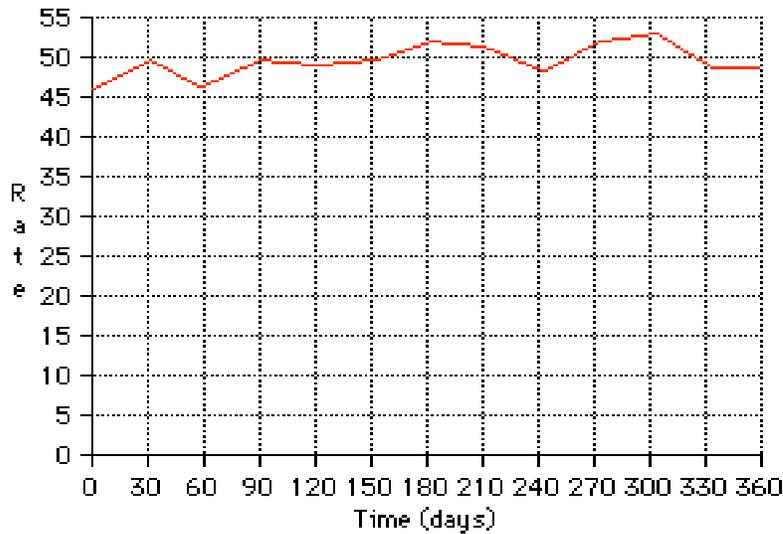
Figure 2: Graph showing rate of petroleum production from the Troll-II field during 2000. (**NOTE:** Rate is measured in thousands of cubic meters of petroleum per day.)

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[1] Source: Norwegian Petroleum Directorate (www.nod.no)

- **Is the estimate the you produced an over-estimate or an under-estimate of the total amount of oil produced by the Troll-II platform? How do you know?**

- **Use the production data in Table 1 and Figure 2 to find a reasonably accurate estimate for the total amount of oil produced by Troll-II that is an under-estimate. Represent your under-estimate graphically on the plot shown below.**

- **Use the production data in Table 1 and Figure 2 to find a reasonably accurate estimate for the total amount of oil produced by Troll-II that is an over-estimate. Represent your over-estimate graphically on the plot shown below.**