Problem 12-70

To Find the EOQ for part (a), we can use the formula:

$$Q^* = \sqrt{\frac{2DC_0}{C_h}}$$

Given that our annual demand is $2,100lb$, item cost is \$2 per lb, inventory cost rate is 21 percent. We have:

$$D = 2,100$$
$$C_0 = \$42$$
$$C_h = 0.21 \cdot 2 = 0.42$$

Which gives us:

$$Q* = \sqrt{\frac{2 \cdot 2100 \cdot 42}{.42}} = 648.07lb$$

Therefore, the Economic Order Quantity is \$648.07 lb.

For the total cost, we use the formula:

$$TC = \frac{1}{2}C_h \cdot Q + \frac{D}{Q}C_0$$

This gives us:

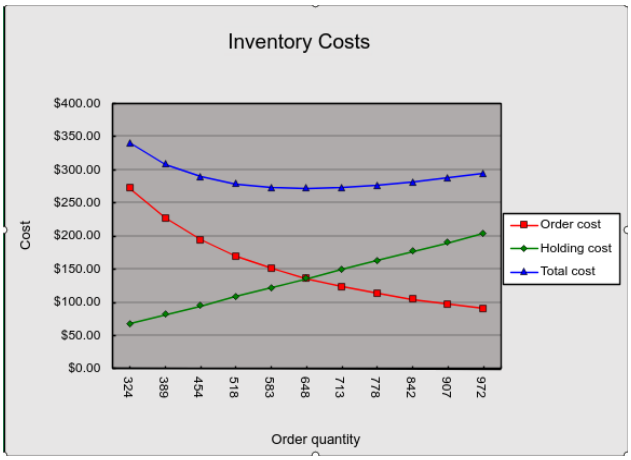
$$tc = \frac{1}{2}(0.42) \cdot 648.07 + \frac{2100}{648.07}(42)$$
$$tc = 272.19$$

Therefore, our Total cost is \$272.19

Using the Excel spreadsheets chart calculations with the following entriess:

Order Quantity	Order cost	Inventory cost	Total cost
324	\$272.19	\$68.05	\$340.24
389	\$226.83	\$81.66	\$308.48
454	\$194.42	\$95.27	\$289.69
518	\$170.12	\$108.88	\$279.00
583	\$151.22	\$122.49	\$273.70
648	\$136.10	\$136.10	\$272.19
713	\$123.72	\$149.71	\$273.43
778	\$113.41	\$163.31	\$276.73
842	\$104.69	\$176.92	\$281.61
907	\$97.21	\$190.53	\$287.74
972	\$90.73	\$204.14	\$294.87

We get the following line chart:



Now assuming that six percent of the chemical is not used and disposed of, with a disposal cost of \$0.50 per lb. To find the new EOQ, we need to calculate our new value for C_h. This is done by:

$$C_h + \text{ disposal cost} \cdot \text{ \% of product disposed.}$$

That gives us:

$$C_h = 0.42 + 0.5 \cdot 0.06 = 0.45$$

Now our new EOQ is:

$$Q* = \sqrt{\frac{2 \cdot 2100 \cdot 42}{.45}} = 626.1$$

Changing the value of C_H in our calculation of TC we get:

$$TC = \frac{1}{2}(0.45) \cdot 648.07 + \frac{2100}{648.07}(42)$$
$$TC = 281.91$$

Finally, we can conclude that the company can actually save additional cost while protecting the enviroment, since the total cost is now higher.