October 14, 2009

Wynne Barrels
900 Hwy 285
Pecos, TX

Applied Solutions
237 Pasteur Hall
Winona, MN

Dear Sir or Ma'am,

I am the proud owner of a big Texas company that manufactures and sells oil barrels. I've got a guy who compiled enough data to fill my 10-gallon hat, but that idiot don't know nothing about how to use the equations he came up with. This is all that he can tell me for sure:

- The demand for oil barrels is given by the equation:

$$2p - 17{,}105{,}156 = 2q^3 - 1498q^2 - 590q$$

  where p is the price (in dollars) we charge per million barrels and q is the number of millions of barrels we sell.

- The cost (in dollars) to produce q millions of barrels is given by the equation:

$$C = q^4 - 238q^3 + 20{,}304q^2 + 516q + 1790.$$

I also know that these formulas aren't worth a darn if q is more than 90 million barrels from personal experience. So here's what I'd like to know.

- Right now we slated to produce 20 million barrels. Am I even going to make a profit? If so, how much?
- I've been trying to get a better handle on how much it costs to make my barrels. At what production level is my marginal cost the most and where is it the least?
- Lastly, let me be a straight-shooter with y'all. I really only care about profit. At what level of production is my profit the most?

Thanks for all your help.

Sincerely,

J Rex Wynne

J. Rex Wynne