(1) A company hired a market research firm to determine the effectiveness of advertising. Currently, the company uses 12 million dollars for advertising each year, and makes 1650 sales of their rather expensive product each month. The market research company concluded that if 15 million dollars were spent for advertising each year, the monthly sales would double.

(a) How quickly will sales grow as a result of increasing the advertisement budget from 12 million each year to 15 million dollars each year? Show work and craft your concluding statement carefully. (Watch the different time frames!)

(b) How much profit would each individual sale have to generate so that this increase in advertisement expenditure is worthwhile? Show enough work so anyone can see how you arrived at your answer. Your answer should be in form of a complete sentence.
(2) On March 11 2015, at noon, the temperature in Cincinnati OH (elev. 500ft) was 51°F. At the elevation of 25,000 ft above Cincinnati, the temperature was -62°F at the same time.

(a) How fast does temperature change as we increase in altitude from the ground to 25,000ft? Show work, and answer the question with a complete sentence.

(b) If we shoot a rocket from the ground straight up, and the rocket reaches the altitude of 25,000 feet in 1 minute, make a statement about how fast the rocket moves. The rocket's speed should be in miles per hour.

(c) There are sensitive rubber parts separating the fuel tank from the engine, where fuel is burned and it is very hot. If temperature changes faster than the rate of 3°F per second, the rubber seal will get porous, create a leak, and the rocket will explode. Should we expect that this will happen, or not? Show relevant calculations which may use results from (a) and/or (b), and explain how you reached your conclusion.