Patriots over Israel

On June 8, 2015, Iran launches an intermediate range ballistic missile (IRBM) at Israel having a WMD warhead. Israel is protected along it borders by US Patriot missile batteries.

At t = 0 seconds, one of the US Patriot missile batteries detects the incoming IRBM warhead at a height of 222,000 feet and having a vertical downward velocity of 4307 feet / second.

Case I (early launch): If a Patriot missile can be launched _**no sooner**_ than 15 seconds after detection, **determine**

- **the altitude and time (in seconds) after launch the Patriot can intercept the incoming IRBM warhead.**

Case II (latest launch): If the _minimum altitude_ the IRBM can be intercepted is 2 miles, determine

- **the latest time a Patriot can be launched to intercept an IRBM.**

The Patriot missile's upwards velocity at launch is known to be 8185 feet/sec.

Include an Excel graph of both missiles' altitude vs. time in seconds showing where they intersect (the time and the height) for both the early and late launch cases.

Remember all ballistic motion (simplified) is governed by the equation:

h(t) = (-1/2)*g*t^2 + Vo*t + So

Where:
h(t) is the height at any time t (seconds)
g = 32.2 ft/sec^2 [acceleration due to gravity]
Vo = is the initial velocity (ft/sec, downwards is -, + is upwards)
So is the initial height (ft)

Present you solution work in a neat, word-processed (MS Word.docx) format with no handwriting. Include an image of this sheet as Appendix A. Send this Word document as an email attachment to mheinen_1@msn.com **NLT midnight** Sunday, Oct 26, 2014.

Explicitly identify the answer(s)!