

8. (10 points) A typical student spends the 24 hours leading up to this exam sleeping, studying, eating, and Facebook stalking. Suppose the total amount of time spent on eating and Facebook is 8 hours. The student's score on the exam, E (out a possible 100 points) depends on S , the number of hours of sleep the student enjoys during the 24 hours leading up to the exam. To be precise,

$$E(S) = 40 \sin\left(\frac{5\pi}{51}(S - 3.4)\right) + 36$$

How many hours should the student study in the day leading up to the exam to maximize his / her score?

[You must use calculus - not just your calculator - and show your work to receive full credit.]