7. [15 points] In one of his experiments, David recorded the speeds (in km/sec) of two different particles, particle A and particle B, for 8 seconds.
Let $S(t)$ be the difference between the recorded speeds of the two particles (in km/sec) t seconds after the beginning of the experiment, i.e. $S(t)$=(speed of particle A)-(speed of particle B).
David found that $S(t) = -\frac{5}{8}t^2 + 5t - 4$.

a. [5 points] Find **both coordinates** of the *maximum* of $S(t)$ by completing the square. Show your work step-by-step.

$S(t)$ has a *maximum* at _____

b. [4 points] Find all t-values when the speeds of the two particles are equal to each other. Be sure to show your work and give you answer in **exact** form.

c. [3 points] The average rate of change of $S(t)$ between $t = 2$ and $t = 5$ is $0.625 \ \frac{\text{km/sec}}{\text{sec}}$. Give a practical interpretation for this average rate of change.

d. [3 points] Find all t-values in the practical domain of $S(t)$ when particle B is moving faster than particle A.

