AP Test Question 2006 No Calculator Allowed

4)

t (seconds)	0	10	20	30	40	50	60	70	80
v(t) (ft / sec)	5	14	22	29	35	40	44	47	49

Rocket A has positive velocity $v(t)$ after being launched upward from an initial height of 0 feet at time $t = 0$ seconds. The velocity of the rocket is recorded for selected values of t over the interval $0 \le t \le 80$ seconds, as shown in the table above.

a) Find the average acceleration of rocket A over the time interval $0 \le t \le 80$ seconds. Indicate units of measure. $\frac{11}{20}$ **ft/sec²**

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b) Using correct units, explain the meaning of $\int_{10}^{70} v(t)\,dt$ in terms of the rocket's flight. Use a midpoint Riemann sum with 3 subintervals of equal length to approximate $\int_{10}^{70} v(t)\,dt$. **2020 ft**

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c) Rocket B is launched upward with an acceleration of $a(t) = \frac{3}{\sqrt{t+1}}$ feet per second per second. At time $t = 0$ seconds, the inital height of the rocket is 0 ft, and the intial velocity is 2 ft/sec. Which of the two rockets is travelling vaster at time $t = 80$ seconds? Explain your answer.

Rocket A **49 ft/sec** < Rocket B **50 ft/sec**