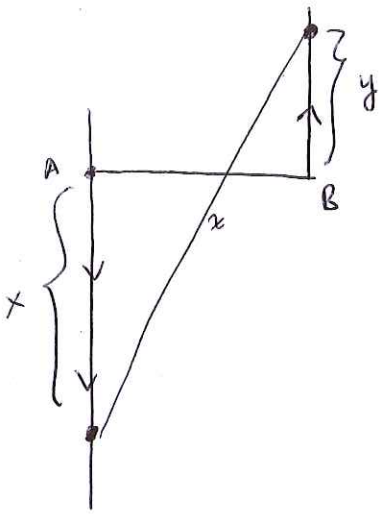
AP Calculus AB Mr. Shubleka Quiz: 22

Present neatly on separate paper. Justify for full credit. ~~No Calculators.~~

Name KEY / SHUBLEKA. Score _____ 8 minutes

1.

At noon, ship A is 100 km west of ship B. Ship A is sailing south at 35 km/h and ship B is sailing north at 25 km/h. How fast is the distance between the ships changing at 4:00 PM?



$(x+y)^2 + 100^2 = z^2$ $\quad \frac{dx}{dt} = 35 \text{ km/h}$ $\quad \frac{dy}{dt} = 25 \frac{\text{km}}{\text{h}}$

@ 4pm: $z = \sqrt{100^2 + 240^2} = 260$ km

$x = 140$ km

$y = 100$ km

$2(x+y)\left(\frac{dx}{dt} + \frac{dy}{dt}\right) = 2 \cdot z \cdot \frac{dz}{dt}$

$\frac{dz}{dt} = \left[(x+y)\left(\frac{dx}{dt} + \frac{dy}{dt}\right)\right] \Big/ z$

@4pm $\frac{dz}{dt} = \frac{240 \cdot 60}{260} = \frac{720}{13}$ km/hr

At 4pm, the distance between the ships is increasing at a rate of $\frac{720}{13}$ km/hr. (approx. 55.385 km/hr).