

AP[®] Calculus BC 2003 Sample Student Responses Form B

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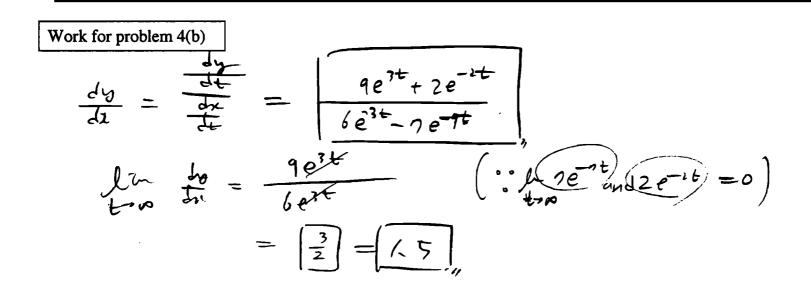
NO CALCULATOR ALLOWED

CALCULUS BC SECTION II, Part B Time—45 minutes

Number of problems—3

No calculator is allowed for these problems.

Work for problem 4(a)



Continue problem 4 on page 11.



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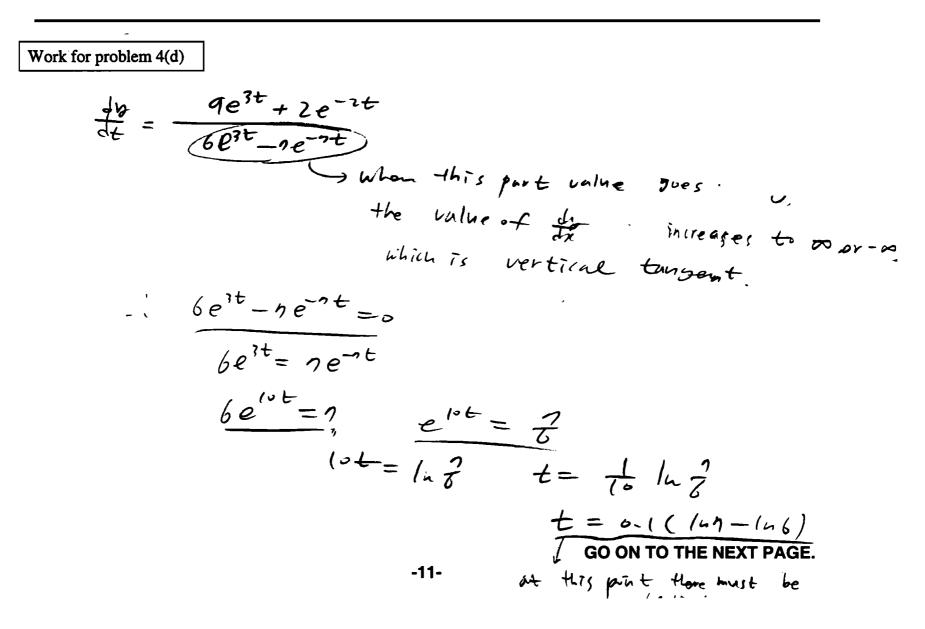
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Work for problem 4(c) thorizon hal trangent is $\frac{f'(x)=0}{f(x)=0} = \frac{4}{f(x)}$ $\frac{dw}{dx} = \frac{4e^{3t} + 2e^{-2t}}{6e^{3t} - 2e^{-t}} = 0$ but $4e^{3t} > 0$ ($t \in IR$) $2e^{2t} > 0$ ($t \in IR$) $50 \quad 4e^{3t} + 2e^{-2t} > 0$ ($t \in IR$) Herefore there is no horizontal tangent.



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CALCULUS BC SECTION II, Part B

Time—45 minutes

Number of problems—3

No calculator is allowed for these problems.

Work for problem 4(a)

$$y'(t) = 3 \times e^{3t} \times 3 - e^{-2t} \times (-2) = 9e^{3t} + 2e^{-2t}$$

 $\chi'(t) = 6e^{3t} - \eta e^{-nt}$
velocity vector for the particle $(6e^{3t} - \eta e^{-nt}, 9e^{3t} + 2e^{-2t})$
 $speed = |velocity| = \left|\frac{qe^{3t} + 2e^{-2t}}{6e^{3t} - \eta e^{-nt}}\right| = \left|\frac{q+2}{6-\eta}\right| = (1)$

Work for problem 4(b)

$$\frac{dy}{dx} = \frac{9e^{3t} + 2e^{-2t}}{6e^{3t} - 7e^{-nt}}$$

$$\lim_{t \to \infty} \frac{dy}{dx} = \lim_{t \to \infty} \frac{9e^{3t}}{6e^{3t}} = \lim_{t \to \infty} \frac{3}{2} = \frac{3}{2}$$

Continue problem 4 on page 11.

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Work for problem 4(c)
The line tangent to the parth of the particle that is horizontal
must have a slope of 0.
Find values of t where
$$\frac{dy}{dx} = 0$$

 $9e^{3t} + 2e^{-2t} > 0$. for all values of t
because e^{3t} is always a positive value
and e^{-2t} is also always a positive value
Therefore, none exists.

Work for problem 4(d) For the line tangent to the path of the particle to be vertical, $\frac{dy}{dx}$ must be inpinite. $\frac{dy}{dx}$ is infinite when $6e^{3t} - 7e^{-nt} = 0$ $6e^{3t} = 7e^{-nt}$

GO ON TO THE NEXT PAGE.

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