20111

t

4 O$(0,0,0)$ A$(t,0,0)$ B$(0,1,0)$ C$(0,0,1)$

OABC

P r t

t P

OABC

2 [ ]

(1)

[H]

70120

[scale=2.0, tdplot$_m ain_c oords, point/.style = circle, fill = gray, inner sep = 0pt, minimum size = 2pt, label/.style = anchor = north west$]

(O) at (0,0,0); [point] at (O) ; [anchor=south west] at (O) O;

(A) at (2,0,0); (B) at (0,1,0); (C) at (0,0,1);

[-Stealth,thick] (O) -> ++(2.5,0,0) node [label] x; [-Stealth,thick] (O) -> ++(0,2.5,0) node [label] y; [-Stealth,thick] (O) -> ++(0,0,2.5) node [label] z;

[thick] (O) – (A) node [midway, below] ; [thick] (O) – (B) node [midway, left] ; [thick] (O) – (C) node [midway, above] ; [thick] (A) – (B) node [midway, below right] ; [thick] (B) – (C) node [midway, above left] ; [thick] (C) – (A) node [midway, right] ;

[label=below] at (A) A(t,0,0); [label=right] at (B) B(0,1,0); [label=above] at (C) C(0,0,1);

$OABC$

$OABC$ -

$f(t) = \frac{V_1}{V_2}$
(1) $\mathrm{V}_1 =$
$\frac{4}{3}\pi r^3$
$V_2 = \frac{1}{6}t$ $f(t)$

f(t) $= 8\pi r^3 \overline{}$

$t = 8\pi\frac{1}{t}\left(\frac{t}{1+2t+\sqrt{2t^2+1}}\right)^3 = 8\pi\frac{t^2}{(1+2t+\sqrt{2t^2+1})^3}$

t $t > 0$ $f(t)$
$f(t)$ $f'(t)$

g(t)

$= 1 + 2t + \sqrt{2t^2 + 1}$
$g'(t) = 2 +$
$\frac{2t}{\sqrt{2t^2+1}}$ f'(t)
$= 8\pi 2t\, g(t)^3 -$
$3t^2 g(t)^2 g'(t)_{\overline{g(t)^6 = \frac{8\pi t}{g(t)^4}[2g(t) - 3tg'(t)]}}$

$f'(t)$

$h(t) = 2g(t)-$
$3tg'(t)$
eq:5 $h(t)$
h(t) $= 2(1$+2t+$\sqrt{2t^2+1})-$
$3t\left(2+\frac{2t}{\sqrt{2t^2+1}}\right)$
$= 2 - 2t +$

$2\sqrt{2t^2+1}-$
$\frac{6t^2}{\sqrt{2t^2+1}}$
$= \frac{2}{\sqrt{2t^2+1}}\left[(1-t)\sqrt{2t^2+1}+(1-t^2)\right]$
$= \frac{2}{\sqrt{2t^2+1}}(1-t)\left(1+t+\sqrt{2t^2+1}\right)$
$(1-$

$t)$ $f(x)$ table:1

t	0	1	(∞)
f'		$+0$ -	
f	0 $\nearrow$	$\searrow$	0

[H] f

$t=1$ eq:5

g(1)=3+$\sqrt{3}$

f(1) $= 8\pi \frac{}{(3+\sqrt{3})^3 = \frac{18-10\sqrt{3}}{9}\pi}$

$\cdots$( )

[ ] $f(t)$ $t =$

$0, \infty$ $f(t) = 0$

$t = 1$ ABC

$f(t)$ fig:2

[H] [axis
lines=middle,
xmin=0, xmax=4,
ymin=0, ymax=0.5,
xlabel=t, ylabel=y,
xtick=1, xticklabels=1,

ytick=0.237,
yticklabels=$f(1)$,
grid=none, clip=false,
]

[blue, thick,
domain=0.:4,
samples=100,smooth]

8*pi*(x*x)/(1+2*x+sqrt(2*x*x+1))^3;
[above right] at (axis cs:2, 0.2) $f(t)$;
[black] (axis cs:1, 0.237) circle (2pt); [dashed]

(axis cs:1, 0.237)
– (axis cs:0,
0.237); [dashed]
(axis cs:1, 0.237)
– (axis cs:1,
0); $f(t)$ $.t =$
1