

AP Review 5

46. a)  $\frac{r}{h} = \frac{5}{10} \quad r = \frac{h}{2} \rightarrow$  use this for  $r$   
 $V = \frac{1}{3}\pi r^2 h \quad V = \frac{1}{3}\pi \left(\frac{h}{2}\right)^2 h @ h=5,$   
 $V = \frac{1}{3}\pi \left(\frac{125}{4}\right)$

$V = \frac{125\pi}{12} \text{ cm}^3 \rightarrow$  remember units!!

b)  $V = \frac{\pi}{12} h^3$   
 $\frac{dV}{dt} = \frac{\pi}{4} h^2 \frac{dh}{dt}$

F:  $\frac{dV}{dt}$

w:  $h=5$

G:  $\frac{dh}{dt} = -3/10$

E:  $V = \frac{\pi}{3} (h/2)^2 (h) = \frac{\pi}{12} h^3$

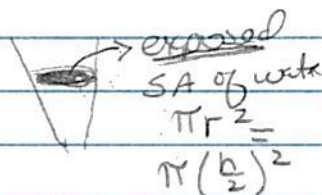
$\frac{dV}{dt} = \frac{\pi}{4} (25) \left(-\frac{3}{10}\right) = \boxed{-\frac{15\pi}{8} \text{ cm}^3/\text{hr}}$

c)  $\frac{dV}{dt} = \frac{\pi}{4} h^2 \frac{dh}{dt} = K\pi \left(\frac{h}{2}\right)^2$

$\pi/4 h^2 \frac{dh}{dt} = K \pi/4 h^2$

$\frac{dh}{dt} = K$

$\boxed{-3/10 = K}$



C 47.  $\frac{dy}{dx} = y \sec^2 x \quad (0, 5)$

$\int \frac{dy}{y} = \int \sec^2 x \, dx$

$\ln|y| = \tan x + C \quad (0, 5)$

$\ln 5 = \tan 0 + C \quad C = \ln 5$

$\ln|y| = \tan x + \ln 5$

$y = e^{\tan x + \ln 5} \quad y = e^{\tan x} \cdot e^{\ln 5}$

$\boxed{y = 5e^{\tan x}}$

\* Calc B 48.  $\frac{1}{1-(-1)} \int_{-1}^1 e^{-x^2} = \boxed{.747} = .75$

C 49.  $\frac{dy}{dx} = \frac{1}{x}$

$\int dy = \int \frac{1}{x} dx$

$y = \ln x + C \quad (1, 0) \rightarrow C = 0$

$y = \ln x \quad \frac{\ln 4 - \ln 1}{4-1} = \frac{\ln 4}{3} = \frac{\ln 2^2}{3} = \boxed{\frac{2 \ln 2}{3}}$

D 50.  $\int dy = \int \frac{1}{x+1} dx$  ( $dy/dx = \frac{1}{x+1}$ )

$y = \ln|x+1| + C$  (0,0)  $C=0$

$y = \ln(x+1)$  approx  $y(1)$  using Euler's  $\Delta x = .5$

$y(1) \approx 5/6$

x	y	$\Delta y = \max$	$y_{\text{new}}$
0	0	$1(.5)$	$0 + .5 = .5$
.5	.5	$\frac{2}{3}(\frac{1}{2}) = \frac{1}{3}$	$\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$
1	$\frac{5}{6}$		

C 51. asking to find  $L$  (carrying capacity)

$dN/dt = .05N - .0005N^2$

Form:  $\frac{dN}{dt} = KN(L-N)$

$dN/dt = .0005N(100 - N)$

$\lim_{t \rightarrow \infty} N(t) = \underline{\underline{L}}$

$\lim_{t \rightarrow \infty} N(t) = 100$