AP Review 3 Non-Calc

25. a) See w/s

b) $dy/dx = .xy$

$\int \frac{dy}{y} = \int x\,dx \quad \ln|y| = \frac{x^2}{2} + C \quad (0,5)$

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

$\ln|y| = \frac{x^2}{2} + \ln 5$

$y = e^{x^2/2 + \ln 5} \quad y = e^{x^2/2} \cdot e^{\ln 5} \quad y = 5e^{x^2/2}$

x	y	$\Delta y = m\Delta x$	y new	$\Delta x = .1$
0	5	0(.5) = 0	5	
.1	5	.5(.1)	.5 + .05	
.2	5.05			

$\boxed{f(.2) \approx 5.05}$

c) $y = 5e^{(.2)^2/2}$

$\boxed{y = 5e^{.02}} \rightarrow 5.101$

C 26. $f(t) = g'(x)$ $g(x)$ has max where $g'(x)$ chgs + to −

This occurs @ $x = c$

E 27. $\sin\theta = \frac{1}{5}x$

$\star \cos\theta \, d\theta/dt = 1/5 \, dx/dt$

$\cos\theta = 4/5 \quad 4/5(3) = 1/5 \, dx/dt$

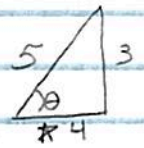
$\boxed{12 = dx/dt}$

F: dx/dt

w: $x = 3$

G: $d\theta/dt = 3$

E: $\sin\theta = \frac{x}{5}$



D 28.

29. $f(0)=2 \quad f'(0)=-3 \quad f''(0)=0 \rightarrow f''$ cont.

$g'(x) = e^{-2x}(3f(x)+2f'(x))$ for all x

a) $y-2=-3(x-0) \qquad y=-3x+2$

b) No, since we don't know if f'' chgs signs @ $x=0$

c) $g(0)=4 \quad g'(0) = e^{0}(3f(0)+2f'(0))$

$= 3(2)+2(-3) = 0 = m$

$y=4$

d) $g' = 3f(x)e^{-2x} + 2f'(x)e^{-2x}$

$g'' = 3f'(x)e^{-2x} + 3f(x)(-2)e^{-2x} + 2f''(x)e^{-2x} + 2f'(x)(-2)e^{-2x}$

$g'' = e^{-2x}(3f'(x) - 6f(x) + 2f''(x) - 4f'(x))$

$g'' = e^{-2x}(-6f(x) - f'(x) + 2f''(x))$

$g''(0) = -6(2) - (-3) + 2(0) = -9$ (Concave down)

$g'(0) = 0 \quad \therefore$ By 2nd der. test, g has a local max at $x=0$

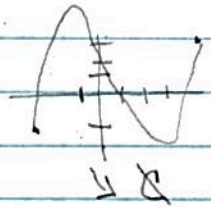
A 30. $\lim_{h\to 0} \frac{\ln(e+h)-1}{h}$ FORM

$= \lim_{x\to e} \frac{\ln(x)-\ln e}{x-e} \rightarrow f(x)=\ln x \quad \frac{d}{dx}[\ln x] \text{ @ } x=e$

$f'(e)$

★ Recall: $\lim_{x\to \pi/2} \frac{\cos(x)-\cos \pi/2}{x-\pi/2}$ is der. of $\cos(x)$ @ $\pi/2$

D 31. $f(-3)=-1 \quad f(6)=3$ (IVT)



E 32. $\frac{dy}{dx} = (1+\ln x)y$

$\int \frac{dy}{y} = \int (1+\ln x)dx$

$\ln|y| = x + x\ln x - x + C$

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

$y = e^{x\ln x}$

u	dv	C
$+x^2$	$\sin x$	
$-2x$	$-\cos x$	
$+2$	$-\sin x$	
-0	$\cos x$	

33. $\int x^2 \sin x = -x^2\cos x + 2x\sin x + 2\cos x + C$