4. $y = \frac{\tan x}{1+\cos x}$

$\frac{dy}{dx} = \frac{(1+\cos x)\sec^2 x - \tan x(-\sin x)}{(1+\cos x)^2}$

8. $xe^y = y\sin x$

$1e^y + xe^y\frac{dy}{dx} = \frac{dy}{dx}\sin x + y\cos x$

$(xe^y - \sin x)\frac{dy}{dx} = y\cos x - e^y$

$\frac{dy}{dx} = \frac{y\cos x - e^y}{xe^y - \sin x}$

16. $y = \left(\frac{v-1}{v^2+v+1}\right)^4$

$\frac{dy}{dv} = 4\left(\frac{v-1}{v^2+v+1}\right)^3 \frac{(v^2+v+1)(1) - (v-1)(2v+1)}{(v^2+v+1)^2}$

28. $y = (\cos x)^x$;

$\ln y = x\ln\cos x$

$\frac{dy}{dx} = y\frac{d}{dx}(x\ln\cos x) = (\cos x)^x\left\{1\ln\cos x + x\frac{-\sin x}{\cos x}\right\}$

34. $y = 10^{\tan\pi\theta}$

$\frac{dy}{d\theta} = 10^{\tan\pi\theta}(\ln 10)(\sec^2\pi\theta)(\pi)$

60. $x^2 + 4xy + y^2 = 13 \quad (2,1)$

$2x + 4y + 4x\frac{dy}{dx} + 2y\frac{dy}{dx} = 0$

when $x = 2$, $y = 1$

$4 + 8 + 8\frac{dy}{dx} + 2\frac{dy}{dx} = 0$

$10\frac{dy}{dx} = -8$

$\frac{dy}{dx} = -\frac{4}{5}$

$y - 1 = -\frac{4}{5}(x-2)$ and $y - 1 = \frac{5}{4}(x-2)$

(94) $P(t) = P_0 e^{kt}$ $\quad P_0 = 100$

$P(5.24) = 50$

$50 = 100 e^{k\,5.24}$

$.5 = e^{5.24k}$

$\ln .5 = 5.24k \Rightarrow k = \frac{\ln .5}{5.24}$

$P(t) = 100\, e^{\left(\frac{\ln .5}{5.24}\right)t}$

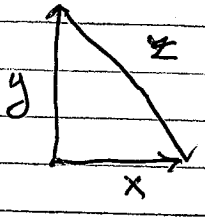
(a) $P(20) = 100\, e^{\left(\frac{\ln .5}{5.24}\right)(20)} = 100\left(\frac{1}{2}\right)^{\frac{20}{5.24}}$

(b) Solve for t $\quad 1 = P(t) = 100\, e^{\left(\frac{\ln .5}{5.24}\right)t}$

$.01 = e^{\left(\frac{\ln .5}{5.24}t\right)}$

$\ln .01 = \frac{\ln .5}{5.24}t \Rightarrow \boxed{t = \frac{5.24 \ln .01}{\ln .5}}$

(99)



Find $\frac{dz}{dt}$ when $t = 3$ and $\frac{dy}{dt} = 15$ ft/second

$\frac{dx}{dt} = 5$ ft/second

$x(t) = 5t$

$y(t) = 45 + 3t$

$z^2 = x^2 + y^2$

$2z\frac{dz}{dt} = 2x\frac{dx}{dt} + 2y\frac{dy}{dt}$

$\frac{dz}{dt} = \frac{x\frac{dx}{dt} + y\frac{dy}{dt}}{z} = \frac{45(15) + 60(5)}{\sqrt{45^2 + 60^2}}$

$= \frac{45(15) + 60(5)}{15\sqrt{3^2 + 4^2}}$

$= \frac{45(15) + 60(5)}{15(5)} = 9 + 4$

$= 13$ ft/sec.

(103) $f(x) = (1+3x)^{\frac{1}{3}}$

$f(0) = 1$

$f'(x) = \frac{1}{3}(1+3x)^{-2/3}(3) = (1+3x)^{-2/3}$

$f'(0) = 1$

$L(x) = f(0) + f'(0)(x-0) = 1 + 1(x-0) = \boxed{1+x}$

$L(.01) = 1 + .01 = 1.01$

(104) $y = x^3 - 2x^2 + 1 \quad x = 2, \; dx = .2$

$dy = (3x^2 - 4x)\,dx$

$= (3(4) - 4(2))(.2) = 4(.2) = .8$