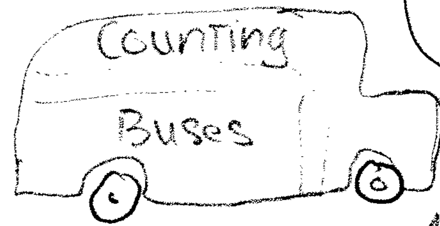
Homework

HW #7



2.5.16

a)

$$f(x) = \sqrt{4x^2 + (8-x^2)^2} = \left[4x^2 + (8-x^2)^2\right]^{1/2}$$

$$f'(x) = \frac{1}{2}\left(4x^2 + (8-x^2)^2\right)^{-1/2} \cdot \frac{d}{dx}\left(4x^2 + (8-x^2)^2\right)$$

$$= \frac{1}{2} * \frac{8x + \left[2(8-x^2)\right] * 2x}{\sqrt{4x^2 + (8-x^2)^2}}$$

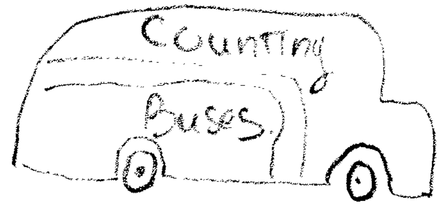
$$= \frac{1}{2} * \frac{8x + (16 - 2x^2] * 2x}{\sqrt{4x^2 + (8-x^2)^2}}$$

$$= \frac{1}{2} * \frac{8x + 32x - 4x^3}{\sqrt{4x^2 + (8-x^2)^2}}$$

$$= \frac{1}{2} * \frac{40x - 4x^3}{\sqrt{4x^2 + (8-x^2)^2}}$$

$$= \frac{2x(10 - x^2)}{\sqrt{4x^2 + (8-x^2)^2}}$$

2.5.16



b) $f(x) = \left(\sqrt{4x^2+8} - x^2\right)^2$

$$f'(x) = 2\left(\sqrt{4x^2+8} - x^2\right) * \left[\frac{1}{2}(4x^2+8)^{-1/2} * 8x - 2x\right]$$

$$= \left(\sqrt{4x^2+8} - x^2\right)\left(\frac{8x}{\sqrt{4x^2+8}} - 2x\right)$$

$$= \left(\sqrt{4x^2+8} - x^2\right)\left(\frac{8x - 2x\sqrt{4x^2+8}}{\sqrt{4x^2+8}}\right)$$

2.3

DGK

12) $f(x) = \dfrac{4x^2 - x + 3}{\sqrt{x}}$ $\dfrac{f}{g}$ $(f/g)' = \dfrac{f'g - g'f}{g^2}$

$$f' = \frac{(8x-1)(\sqrt{x}) - [(4x^2 - x + 3)(\frac{x}{2}^{-1/2})]}{x}$$

$$f' = \frac{8x \cdot \sqrt{x} - \sqrt{x} - 4x^2 + x - 3(\frac{x}{2}^{-1/2})}{x}$$

Double Helix

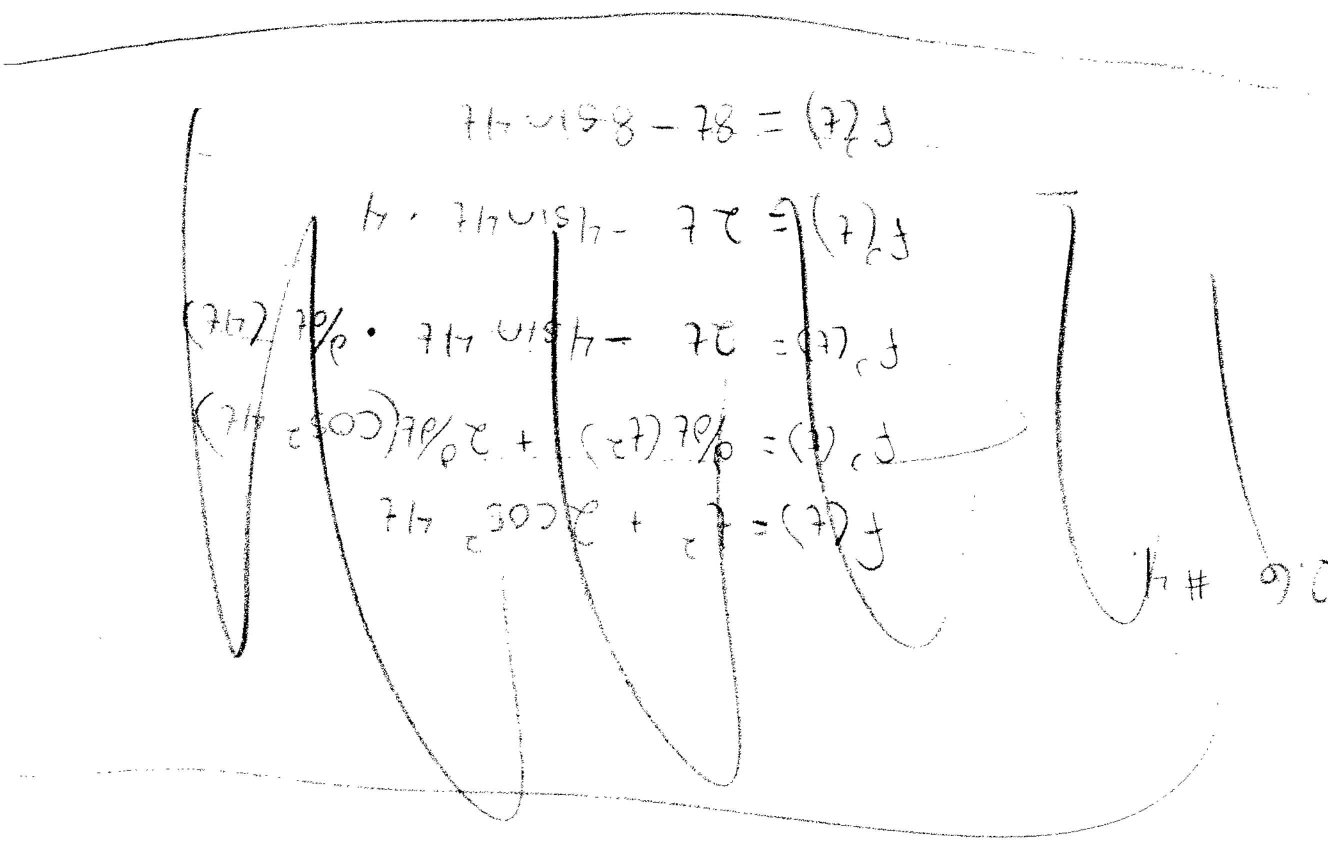
2.6 #16 $f(t) = t^2 + 2\cos^2 4t$

$$t^2 + 2(\cos 4t)^2$$

$$f'(t) = 2t + 4(\cos 4t)' \cdot \tfrac{d}{dt}(\cos 4t)$$

$$= 2t + 4(\cos 4t) \cdot (-\sin(4t)) \cdot \tfrac{d}{dt} 4t$$

$$= 2t + 4(\cos 4t) \cdot (-\sin(4t)) \cdot 4$$



DP-Deutsche Produktion

p. 173 / section 2.6 / 20

a) $f(x) = \cos\sqrt{x}$

$f(x) = \cos(x^{\frac{1}{2}})$

$f'(x) = -\sin(x^{\frac{1}{2}}) \times \frac{1}{2}x^{-\frac{1}{2}}$

b) $f(x) = \sqrt{\cos x}$

$f(x) = (\cos x)^{\frac{1}{2}}$

$f'(x) = \frac{1}{2}(\cos x)^{-\frac{1}{2}} * (-\sin(x))$

c) $f(x) = \cos(\frac{1}{2}x)$

$f'(x) = -\sin(\frac{1}{2}x) \times \frac{1}{2}$

- Investment Banker

2.6

24) $f(x) = \tan 3x,\ a = 0$

Finding the equation of the Tangent line to $y = f(x)$ at $x = a$

$$f'(x) = \sec^2(3x) \cdot \frac{d}{dx}(3x)$$

$$f'(x) = \sec^2(3x) \cdot 3$$

$$f'(x) = 3\sec^2(3x)$$

$$f'(0) = 3\sec^2(3(0))$$

$$f'(0) = 3\sec^2(0)$$

$$f'(0) = 3(1 + \tan^2(0))$$

$$f'(0) = 3(1+0)$$

$$f'(0) = 3(1)$$

$$f'(0) = 3$$

At $x = 0$, the slope of the Tangent line is then $f'(2) = 2$.
The line with slope 2 trough the point $(\overset{a}{0}, \overset{b}{0})$ has the equation:

$$y - b = m(x - a)$$

$$y - 0 = 3(x - 0)$$

$$\underline{\underline{y = 3x}}$$

I.T.

T. Condo
P. Wells
G. Rogers

Section 2.6

#34

use the basic Limits $\lim_{x\to 0} \frac{\sin x}{x} = 1$ and $\lim_{x\to 0} \frac{\cos x - 1}{x} = 0$ to find following limits

$\lim_{x\to 0} \frac{x}{\sin x} = 1$ $\qquad \lim_{x^2\to 0} \frac{\cos x^2 - 1}{x^2} = 0$

a) $\lim_{t\to 0} \frac{2t}{\sin t}$ $\qquad \lim_{x\to 0} \frac{2x}{\sin x} = 2 \cdot 1 = 2$

$a = 2$

B) $\lim_{x\to 0} \frac{\cos x^2 - 1}{x^2}$

$B = 0$

c) $\lim_{x\to 0} \frac{\sin 6x}{\sin 5x}$

$c = \frac{6}{5}$

$$\lim_{6x\to 0} \frac{\sin 6x}{6x} \cdot \lim_{5x\to 0} \frac{5x}{\sin 5x} = 1 \cdot 1$$

$$\lim_{6x\to 0} \frac{\sin 6x}{x} \cdot \lim_{5x\to 0} \frac{x}{\sin 5x} \cdot \frac{5}{6} = 1 \cdot 1$$

$$\lim_{\cancel{x}\to 0} \left(\frac{\sin 6x}{\sin 5x}\right) \cdot \frac{5}{6} = 1$$

$$\lim_{x\to 0} \frac{\sin 6x}{\sin 5x} = \frac{6}{5}$$

#2 Mat finishers

$$y = \sin(\tan(\sin(x)))$$

$$= \cos(\tan(\sin(x))) \cdot \frac{d}{dx}[\tan(\sin(x))]$$

$$= \cos(\tan(\sin(x)) \cdot (\sec^2(\sin(x)) \cdot \frac{d}{dx}(\sin x)$$

$$= \cos(\tan(\sin x) \cdot (\sec^2(\sin(x)) \cdot (\cos x)$$

Julian Ward Mo [illegible] Hiroaki Tomo[illegible]

PURPLE PARROTS

section 2.7 #8

$h(x) = 4^{-x^2}$

$h'(x) = (4^{-x^2} \ln 4)(-2x)$

2.7 #16

XMAS

$f(t) = t^3 \ln t$

$f'(t) = t^3 \cdot \frac{d}{dx} \ln t + \ln t \frac{d}{dx} t^3$

$f'(t) = t^3 \cdot \frac{1}{t} + \ln t \cdot 3t^2$

Timothy Lukowicz
Abraham Sherman

B10

2.7, problem 22

a) $h(x) = 2^{(e^x)}$

$h(x) = e^x \ln 2$

$h'(x) = \left(\frac{dy}{dx} e^x\right)(\ln 2) + \left(\frac{dy}{dx} \ln 2\right)(e^x)$

$h'(x) = e^x(\ln 2) + \frac{1}{2}(e^x)$

$h'(x) = e^x \ln 2 + \frac{e^x}{2}$

b) $f(x) = \frac{e^x}{2^x}$

$f(x) = \frac{e^x}{x \ln 2}$

$f'(x) = \frac{x \ln 2\left(\frac{d}{dx} e^x\right) - e^x\left(\frac{d}{dx} x \ln 2\right)}{(2^x)^2}$

$f'(x) = \frac{x \ln 2(e^x) - e^x(\frac{1}{2})}{2^{2x}}$

$f'(x) = \frac{x e^x \ln 2 - (\frac{e^x}{2})}{2^{2x}}$