/33

$\sqrt[3]{36}$
$3 \cdot 3 \cdot 4$

Homework 3

Due: Tuesday, October 14

1. Use the table to answer the following questions. Show ALL work, just a value will receive no credit!

x	1	2	3	4
$f(x)$	5	4	10	32
$f'(x)$	6	-72	18	-19
$g(x)$	21	32	4	1
$g'(x)$	5/7	3/5	1/7	$-5/7$

   (a) If $h(x) = (f \circ g)(x)$ what is $h'(3)$?

   (b) If $k(x) = e^{f(g(x))}$ what is $k'(4)$?

   (c) If $j(x) = \sin(f(x))$ what is $j'(2)$?

   (d) if $m(x) = \sin(f(x)) \cdot \tan(g(x))$ what is $m'(4)$?

2. If $f(x) = \sqrt[3]{x^2 + 3x + 6}$ what is the equation of the tangent line to $f(x)$ at $x = 0$?

3. Find $f'(x)$ when $f(x) = \sqrt[4]{4x^5 + 5x^4}\tan(\sqrt[4]{4x^5 + 5x^4})$ (Simplify, i.e. factor as much as you can.)

4. Find $f'(x)$ when $f(x) = \dfrac{\sin(x) \cdot \csc(x)}{\cot(x)}$

mk3

1a) $h'(x) = f'(g(x))\, g'(x)$ (+1)

$h'(3) = f'(g(3))\, g'(3)$ (+1)

$= f'(4) \cdot \frac{1}{7}$ (+1)

$= \boxed{-19/7}$

4

13

b) $k'(x) = f'(g(x)) \cdot g'(4) \cdot e^{f(g(x))}$

$k'(4) = f'(g(4)) \cdot g'(4) \cdot e^{f(g(4))}$ (+1 each)

$= f'(1) \cdot (-5/7) \cdot e^{f(1)}$ (+1)

$= 6(-5/7) \cdot e^5$

$= \frac{-30}{7} e^5$

/4

c) $j'(x) = \cos(f(x)) \cdot f'(x)$

$j'(2) = \cos(f(2)) \cdot f'(2)$ (+1 each)

$= -72 \cos(4)$

/3

d) $m'(x) = \cancel{\cos(x) \cdot \sec^2(g(x))}$

$\cos(x) \tan(g(x)) + \sec^2(g(x))\, g'(x) \sin x$

$m'(4) = \cos 4 \tan(g(4)) + \sec^2(g(4))\, g'(4) \cdot \sin 4$

$= \cos 4 \tan(1) + \sec^2(1) \cdot (-5/7) \cdot \sin(4)$

+1 +1 +1 +1 +1

/5

2) $y - f(0) = f'(0)(x-0)$

$f'(x) = \frac{1}{3}(x^2+3x+6)^{-2/3}(2x+3)$ +1

$f'(0) = \frac{1}{3}(6)^{-2/3}(3) = \frac{1}{(36)^{1/3}}$ +1

$f(0) = \sqrt[3]{6}$ +1

$y - \sqrt[3]{6} = 36^{-1/3}(x-0)$

$y = \frac{x}{\sqrt[3]{36}} + \sqrt[3]{6}$ +2

/5

3) $f'(x) = \frac{1}{4}(4x^5+5x^4)^{3/4}(20x^4+20x^3)\tan\sqrt[4]{4x^5+5x^4}$ (+1, +1, +1)

$+ \sec^2\left(\sqrt[4]{4x^5+5x^4}\right)\frac{1}{4}(4x^5+5x^4)^{-3/4}(20x^4+20x^3)(4x^5+5x^4)^{1/4}$ (+1, +1, +1)

$= \frac{(5x^4+5x^3)\left\{\tan\sqrt[4]{4x^5+5x^4} + \sec^2\sqrt[4]{4x^5+5x^4}\left\{4x^5+5x^4\right\}^{1/4}\right\}}{(4x^5+5x^4)^{+3/4}}$

factor $(20x^4+20x^3)$ $+(4x^5+5x^4)^{3/4}$ } +1

$\frac{1}{4}(20x^4+20x^3) = 5x^4+5x^3$ +1

/8

See other pg!

i) $f'(x) = \dfrac{\cot x\{\cos x(-\csc x)\cot x + -\csc x\cot x\sin x\} - -\csc^2 x\sin x\csc x}{\cot^2 x}$

$= \dfrac{\cot x[\cos x\csc x - \csc x\cot x\sin x] + \csc^2 x\sin x}{\cot^2 x}$

+1 +1 +1 +1 +1

/5

3) $f'(x) = \frac{1}{4}(4x^5+5x^4)^{-3/4}(20x^4+20x^3)\cdot\tan\sqrt[4]{4x^5+5x^4}$

$+\sec^2\sqrt[4]{4x^5+5x^4}\cdot\frac{1}{4}(4x^5+5x^4)^{-3/4}(20x^4+20x^3)(4x^5+5x^4)^{1/4}$

$= (20x^4+20x^3)\cdot\frac{1}{4}\cdot(4x^5+5x^4)^{-3/4}\left\{\tan\sqrt[4]{4x^5+5x^4} + \sqrt[4]{4x^5+5x^4}\sec^2\sqrt[4]{4x^5+5x^4}\right\}$

$= 5x^3(x+1)(4x^5+5x^4)^{-3/4}\left\{\tan\sqrt[4]{4x^5+5x^4} + \sqrt[4]{4x^5+5x^4}\sec^2\sqrt[4]{4x^5+5x^4}\right\}$

+1 +1 +1 +1 +1 +1

(+2) med

/8