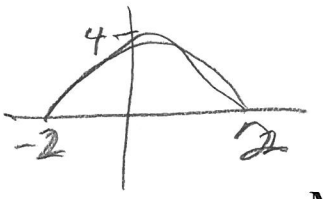

Midterm Sample

MATH203 Section 01 ___ 2010 Fall

1. Find the domain and range of

$4-x^2\geq 0$ $(2-x)(2+x)\geq 0$ $x\in(-2,2)$

(1) $f(x)=\dfrac{1}{\sqrt{4-x^2}}$, (2) $g(t)=\cos(e^{-t})$. $t\in\mathbb{R}$ $t\in(-\infty,\infty)$

2. If $f(x)=\sqrt{x}$, $g(x)=\dfrac{x^2}{4}$, find formulas for the following:

(1) $f(g(x))$, (2) $g(f(x))$.

3. Find the exact value of each expression:

(1) $\arcsin(\frac{1}{2})$, (2) $\arccos(-\frac{\sqrt{2}}{2})$.

4. If $f(x)=x^2$, $x\le 0$, find the formula for f^{-1}.

5. Find the limits:

(1) $\lim\limits_{x\to 1}\dfrac{-1}{3x-1}$, (2) $\lim\limits_{x\to -1}\dfrac{\sqrt{x^2+8}-3}{x+1}$, (3) $\lim\limits_{x\to -3}\dfrac{x+3}{x^2+4x+3}$,

(4) $\lim\limits_{x\to 0}\dfrac{\sin 5x}{\sin 4x}$, (5) $\lim\limits_{x\to\infty}\dfrac{2x^3+7}{x^3-x^2+x+7}$, (6) $\lim\limits_{x\to 0^-}\dfrac{2}{3x}$.

6. If $f(x)=\begin{cases}2x, & 0<x<1\\ 1, & x=1\\ -2x+4, & 1<x<2\end{cases}$

(1) Does $f(1)$ exist? (2) Does $\lim\limits_{x\to 1}f(x)$ exist? (3) Does $\lim\limits_{x\to 1}f(x)=f(1)$?

(4) Is $f(x)$ continuous at $x=1$?

7. Using the definition of derivative, i.e. $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$, find the slope of the function's graph at the given point, then find the equation for the line tangent to the graph there: $f(x)=x^2$, $(2,4)$.

8. Find the first and second derivatives: $y=x^2e^x$.

9. Find y'' if $y=2x+\sin x$.

10. Find y' if $y=\cos(x^2+7x)$.

11. Find $\dfrac{dy}{dx}$ by implicit differentiation if $2x^3+x^2y-xy^3=1$.

8 $y' = 2xe^x + x^2e^x = (2x + x^2)e^x$

$y'' = (2+2x)e^x + (2x+x^2)e^x$

$= (2 + 2x + 2x + x^2)e^x$

$= (2 + 4x + x^2)e^x$

(9) $y' = 2 + \cos x$

$y'' = -\sin x$

(10) $y' = -\sin(x^2+7)(2x+7)$

$6x^2 + 2xy + x^2y' - y^3 - 3xy^2y' = 0$

$x^2y' - 3xy^2y' = -6x^2 - 2xy + y^3$

(11) $6x^2 + 2xy + x^2y' - y^3 - 3xy^3y' = 0$

$x^2y' - 3xy^2y' = -6x^2 - 2xy + y^3$

$y'(x^2 - 3xy^2) = -6x^2 - 2xy + y^3$

$y' = \dfrac{-6x^2 - 2xy + y^3}{x^2 - 3xy^2}$

(7) $\lim_{h\to 0} \dfrac{(x+h)^2 - x^2}{h} = \lim_{h\to 0} \dfrac{x^2 + 2xh + h^2 - x^2}{h} = \lim_{h\to 0} \dfrac{h(2x+h)}{h} = 2x$

$f'(x) = 2x$

$f'(2) = 4$

$y = mx + 6$

$4 = 4(2) + 6$

$-4 = 6$

$y = 4x - 4$

Magic -18

↑ 204

Chem ↑ 188

~~Det/Alt~~ ↑

SAC + 5, ↓

USF

Det +10.5

Mwil +8.5

Hous ↑