MAS051 — Example Sheet 8

To be handed in: Friday, November 15, 2002

Remember to give your Tutorial Group, along with your name, on the assignment. Only the *asterisked* (starred) questions will be marked.

1. Determine the domains of the following functions:

(a) $\dfrac{1}{x+1}$; (b) $\dfrac{x^2}{x^2}$; (c) $\dfrac{1}{x-x^2}$; (d) $\sqrt{1+x}$;

(e) $\dfrac{1}{\cos x}$; (f) $\sqrt{1-x}$; (g) $\sqrt{1+x}$; (h) $\ln(x)$.

2.* Determine the domains of the following functions:

(a) $\dfrac{1}{x-2\sqrt{x}}$; (b) $\sqrt{1+\sin x}$; (c) $\dfrac{1}{x-x^3}$; (d) $\sqrt{1-x^2}$;

(e) $\dfrac{1}{\sin x}$; (f) $\sin(\dfrac{1}{x})$; (g) $\dfrac{x}{x}$; (h) $\sqrt{5x+6}$.

3. Determine the ranges of each of the following functions of x:

(a) $\cos(x)$; (b) $1+x^2$; (c) $1+x^3$; (d) $\dfrac{1+x}{1-x}$;

(e) $\dfrac{3+4x}{1+2x}$; (f) $1-x^2$; (g) $\dfrac{x^2}{x^2}$; (h) $x+\dfrac{1}{x}$.

4.* Determine the ranges of each of the following functions of x:

(a) $\sin(x)$; (b) $\sqrt{x}$; (c) $\dfrac{5+6x}{2+3x}$; (d) $\dfrac{x^2}{x}$;

(e) 2^x; (f) x^4; (g) x^2+2x+5; (h) $1-2x-x^2$.

5. Using a calculator, compute $\dfrac{\tan x}{x}$ correct to 6 decimal places when

(a) $x = 0.1$; (b) $x = 0.01$ (c) $x = 0.001$. [N.B. Set calculator to radians.]

6. Find the inverse f^{-1} for each of the functions f below, on the given domains. State the domain and range of f^{-1f} and sketch f and f^{-1}.

(a) $f(x) = 3x/2+5$; domain all x. (b) $f(x) = -4x/7+1/2$ domain all x.

(c) $f(x) = \sin(2x)$; domain $-\pi/4 \le x \le \pi/4$. (d) $f(x) = 5\cos(x)$; domain $0 \le x \le \pi$.

(e) $f(x) = \sqrt{5x-2}$; domain $x > 2/5$. (f) $f(x) = \sqrt{7x+3}$; domain $x > -3/7$.

7.* Using a calculator, compute $\dfrac{1-\cos x}{x^2}$ correct to 6 decimal places when

(a) $x = 0.1$; (b) $x = 0.01$ (c) $x = 0.001$. [N.B. Set calculator to radians.]

8.* Using a calculator, compute $\dfrac{1-\cos x}{x^2}$ correct to 6 decimal places when

(a) $x = 0.1$; (b) $x = 0.01$ (c) $x = 0.001$. [N.B. Set calculator to radians.]

AJD September 26, 2002