THE CHINESE UNIVERSITY OF HONG KONG
DEPARTMENT OF MATHEMATICS

MATH1520C University Mathematics for Applications 2015
Suggested Solution to Assignment 1

Chapter1.5:23 Ans: $\displaystyle\lim_{x\to-2}\frac{x^2-x-6}{x^2+3x+2}=\lim_{x\to-2}\frac{(x-3)(x+2)}{(x+2)(x+1)}=\lim_{x\to-2}\frac{x-3}{x+1}=\frac{-5}{-1}=5$

Chapter1.5:25 Ans: $\displaystyle\lim_{x\to4}\frac{\sqrt{x}-2}{x-4}=\lim_{x\to4}\frac{\sqrt{x}-2}{(\sqrt{x}-2)(\sqrt{x}+2)}=\lim_{x\to4}\frac{1}{\sqrt{x}+2}=\frac{1}{\sqrt{4}+2}=\frac{1}{4}$

Chapter1.5:59 Ans:

    a. $C(0)=0.4+0.013=0.413$ mg/ml

    b. $C(5)-C(4)=\frac{0.4}{5^{1.2}+1}-\frac{0.4}{4^{1.2}+1}\approx-0.013$. Therefore the concentration decreases by about 0.013 mg/ml.

    c. $\displaystyle\lim_{t\to\infty}C(t)=0.013$. Therefore the residual concentration is 0.013 mg/ml.

Chapter1.6:27 Ans: By definition $f(3)=10$. And

$$\lim_{x\to3^-}f(x)=10\qquad\qquad\lim_{x\to3^+}f(x)=10$$

$\implies \lim_{x\to3}f(x)=10=f(3)$.Therefore $f(x)$ is continuous at $x=3$.

Chapter1.6:57 Ans:By the definition $f(2)=9$ and $\lim_{x\to2^-}f(x)=2A-3=f(2)$ since f is continuous at $x=2$.

    $\implies A=6$

1 Ans: $\displaystyle\lim_{x\to+\infty}\frac{e^x-2}{e^{2x}-4}=\lim_{x\to+\infty}\frac{\frac{e^x-2}{e^{2x}}}{\frac{e^{2x}-4}{e^{2x}}}=\lim_{x\to+\infty}\frac{\frac{1}{e^x}-\frac{2}{e^{2x}}}{1-\frac{4}{e^{2x}}}=\frac{0+0}{1-0}=0$

2 Ans:

(a) By definition, $f(0)=0$

(b) $\displaystyle\lim_{x\to0^-}f(x)=\lim_{x\to0^-}1=1$

    $\displaystyle\lim_{x\to0^+}f(x)=\lim_{x\to0^+}e^{2x}=1$

    Since $\displaystyle\lim_{x\to0^-}f(x)=1=\lim_{x\to0^+}f(x)$, we have $\lim_{x\to0}f(x)=1$

(c) Since $\displaystyle\lim_{x\to0}f(x)=1\neq f(0)$, f(x) is not continuous at x = 0.