習題集 2

(對應 張旭微積分 連續篇重點二：連續函數的運算定理)

In question 1~3, find the x-values (if any) at which $f(x)$ is not continuous.

1. $f(x)=\sqrt{\sin x+3}$

2. $f(x)=\dfrac{x+3}{x^3+27}$

3. $f(x)=\begin{cases}3x-2 & \text{if } x>0\\ -2\cos x & \text{if } x\le 0\end{cases}$

In question 4 and 5, find constants a and b so that the given function is continuous on the entire real line.

4. $f(x)=\begin{cases}\dfrac{\sin 3x}{x} & \text{if } x>0\\ x+a & \text{if } x\le 0\end{cases}$

5. $f(x)=\begin{cases}\dfrac{x}{\pi}+b & \text{if } x\ge 2\pi\\ \dfrac{1-\cos x}{x} & \text{if } 0<x<2\pi\\ a-x^2 & \text{if } x\le 0\end{cases}$

In question 6~8, find the x-values (if any) at which $f(x)$ is not continuous.

6. $f(x)=\sin(3^x-55)$

7. $f(x)=\log(x^2+7x+1)$

8. $f(x)=\tan(\dfrac{x^2-4}{x-2})$

9. Let $f(x)=\dfrac{1}{6-\sqrt{x^6-6}}$. Where is $f(x)$ continuous ?

10. Let $f(x)=\dfrac{\sqrt{x^2-7x+16}-\sqrt{6}}{(x-5)\sqrt{x+1}}$ be a function defined on $x\neq 5$. Define $f(5)$ so that $f(x)$ is continuous everywhere.