Solutions Book Chapter 5, SCI 113 Spring 2008

(1) **Exercise 5.7 (a)** $\dfrac{1}{1+\ln(1+x)} \approx 1-x+\dfrac{3}{2}x^2$, **(b)** $\tan x \approx x+\dfrac{1}{3}x^3+\dfrac{2}{15}x^5$, **(c)** $\dfrac{1}{1+e^x} \approx \dfrac{1}{2}-\dfrac{1}{4}x+\dfrac{1}{48}x^3$, **(d)** $\dfrac{e^x-e^{-x}}{e^x+e^{-x}} = \dfrac{e^{2x}-1}{e^{2x}+1} \approx x^2-\dfrac{1}{3}x^3-\dfrac{1}{3}x^6$, **(e)** $\dfrac{x}{\sin x} \approx 1+\dfrac{1}{6}x^2+\dfrac{7}{360}x^4$.

(2) **Exercise 5.8 (a)** $\left(1-\dfrac{1}{x}\right)^{\frac{1}{2}} \approx 1-\dfrac{1}{2x}-\dfrac{1}{8x^2}$, **(b)** $\ln(1+\dfrac{1}{\sqrt{x}}) \approx \dfrac{1}{\sqrt{x}}-\dfrac{1}{2x}+\dfrac{1}{3x\sqrt{x}}$, **(c)** $\dfrac{\sqrt{x}}{(1+x)^{1/2}} = \left(1+\dfrac{1}{x}\right)^{-1/2} \approx 1-\dfrac{1}{2x}+\dfrac{1}{8x^2}$.

(3) **Exercise 5.13 (a)** 0, **(b)** $-1/2$, **(c)** 0, **(d)** $\dfrac{\sin(1/2)-1}{\cos(5/2)} = 0.64978919$.

(4) **Exercise 5.18 (a)** $\sin 2$, **(b)** $e^{1/2}$, **(c)** $4/3$.