HW 1 *L'Hopital's Rule*

1. 0/0 form. Evaluate the following limits

(i) $\displaystyle\lim_{x\to 1} \frac{\ln x}{4x - x^2 - 3}$ $\qquad$ (ii) $\displaystyle\lim_{x\to 0} \frac{1-\cos 3x}{8x^2}$

(iii) $\displaystyle\lim_{x\to\infty} \frac{e^{1/x}-1}{1/x}$ $\qquad$ (iv) $\displaystyle\lim_{x\to 0} \frac{\tan 4x}{\tan 7x}$

2. ∞/∞ form. Evaluate the following limits

(i) $\displaystyle\lim_{x\to\infty} \frac{3x^4 - x^2}{6x^4 + 12}$ $\qquad$ (ii) $\displaystyle\lim_{x\to\infty} \frac{\ln(3x+5)}{\ln(7x+3)+1}$

(iii) $\displaystyle\lim_{x\to\pi/2} \frac{2\tan x}{\sec^2 x}$ $\qquad$ (iv) $\displaystyle\lim_{x\to\infty} \frac{x^2 - \ln(2/x)}{3x^2 + 2x}$

3. Indeterminate forms. Evaluate the following limits

(i) $\displaystyle\lim_{x\to 0} x\csc x$ $\qquad$ (ii) $\displaystyle\lim_{x\to 1^-} (1-x)\tan\left(\frac{\pi x}{2}\right)$

(iii) $\displaystyle\lim_{x\to 0} (1+4x)^{1/x}$ $\qquad$ (iv) $\displaystyle\lim_{x\to\infty} \left(1+\frac{1}{x}\right)^{\ln x}$

(v) $\displaystyle\lim_{x\to 0} x^{2x}$ $\qquad$ (vi) $\displaystyle\lim_{x\to 0^+} \sin x^{\tan x}$

HW 2 *Substitutions*

1. Indefinite Integral

(i) $\displaystyle\int x^3(x^4+6)^6\,dx$ $\qquad$ (ii) $\displaystyle\int \frac{2x^3}{1-4x^3}\,dx$

(iii) $\displaystyle\int \frac{x}{x-2}\,dx$ $\qquad$ (iv) $\displaystyle\int (x+1)\sqrt{3x+2}\,dx$

2. Definite Integrals

(i) $\displaystyle\int_0^1 2x(4-x^2)\,dx$ $\qquad$ (ii) $\displaystyle\int_0^{\pi/2} \sin^2\theta\cos\theta\,d\theta$

(iii) $\displaystyle\int_{-1}^2 x^2 e^{x^3+1}\,dx$ $\qquad$ (iv) $\displaystyle\int_0^{\ln 4} \frac{e^x}{3+2e^x}\,dx$