Product Rule & Quotient Rule for Derivatives

[1] Evaluate the following limits:

[a] $\lim_{h\to 0}\frac{\sin(h)}{h}$

[b] $\lim_{h\to 0}\frac{\cos(h)-1}{h}$

[c] $\lim_{h\to 0}\frac{\sin(x+h)-\sin x}{h}$

[d] $\lim_{h\to 0}\frac{\cos(x+h)-\cos x}{h}$

[e] $\lim_{h\to 0}\frac{e^h-1}{h}$

[f] $\lim_{h\to 0}\frac{e^{x+h}-e^x}{h}$

[2] Use the product Rule to find the derivative for each function.

[a] $f(x)=x\cdot\cos x$

[b] $f(x)=x^2\cdot\sin x$

[c] $f(x)=x^3\cdot e^x$

[d] $f(x)=e^x\cdot\sin x$

[e] $f(x)=e^x\cdot\cos x$

[f] $f(x)=\sin x\cdot\cos x$

[3] Use the quotient Rule to find the derivative for each function.

[a] $f(x)=\frac{x}{x+2}$

[b] $f(x)=\frac{x+3}{x-4}$

[c] $f(x)=\frac{x^2}{x+1}$

[d] $f(x)=\frac{3x+4}{5x-1}$

[e] $f(x)=\frac{x^2-2}{x^2+2}$

[f] $f(x)=\frac{\sin x}{\cos x}$

[g] $f(x)=\frac{e^x}{x^3}$

[h] $f(x)=\frac{x}{\cos x}$

[i] $f(x)=\frac{x\cdot\cos x}{e^x}$

[j] $f(x)=\frac{x\cdot e^x}{x+2}$

[k] $f(x)=\frac{x\cdot\sin x}{e^x}$

[l] $f(x)=\frac{x^3}{x^2+1}$