Set 011 The "Big Five" Derivative Rules – Sum, Power, Product, Quotient, and Chain

[1 – 20] Find the derivative of each function. Factor whenever possible. Do not leave negative exponents.

[1] $f(x)=e^2$ [2] $f(t)=1-4t$ [3] $f(y)=4y^2-3y+2$ [4] $y=\sqrt{3x}$

[5] $r=\cos 3\theta$ [6] $r=3\cos\theta$ [7] $r=\cos^3\theta$ [8] $r=\cos\theta^3$

[9] $r=\cos^3\theta^2$ [10] $r=\dfrac{1}{\sin\theta+\cos\theta}$ [11] $v(t)=\dfrac{3t-4}{5t+1}$ [12] $v(t)=\dfrac{(2t+3)^4}{(3t+1)^3}$

[13] $a(t)=\dfrac{\cos t}{t\cdot e^t}$ [14] $A(y)=y^2\cdot\sec^2 y$ [15] $f(z)=\dfrac{\pi}{2}e^{-\frac{1}{2}z^2}$ [16] $x(t)=\dfrac{1}{\sqrt{t^2+t+1}}$

[17] $y(t)=\tan\left(e^{2t}\right)$ [18] $f(x)=\sec^2 x-\tan^2 x$ [19] $y(t)=\sin t\cdot e^{\sin t}$ [20] $f(x)=x^5(2x+4)^6$

[21] [a] Find an equation for the tangent line to $y=\sin^2 x$ at $x=\dfrac{\pi}{6}$.

[b] (CALCULATOR) Use the tangent line to approximate $y\left(\dfrac{1}{2}\right)$. Find the percent error in this approximation.

[c] Find an equation for the normal line to $y=\sin^2 x$ at $x=\dfrac{\pi}{4}$.

[22] [a] Find an equation for the tangent line to $f(t)=e^t$ at $t=0$.

[b] (CALCULATOR) Use the tangent line to approximate $f(-0.2)$. Find the percent error in this approximation.

[c] Find an equation for the normal line to $f(t)=e^t$ at $t=1$.

[23] [a] Find an equation for the tangent line to $f(x)=\dfrac{x+5}{x+1}$ at $x=1$.

[b] (CALCULATOR) Use the tangent line to approximate $f(1.2)$. Find the percent error in this approximation.

[c] Find an equation for the normal line to $f(t)=e^t$ at $t=1$.