Set 010 The Chain Rule for Derivatives

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

[1] $f(x)=(x-3)^3$ [2] $f(x)=\sin(4x)$ [3] $f(x)=\cos(x^2-1)$ [4] $f(x)=e^{5x}$

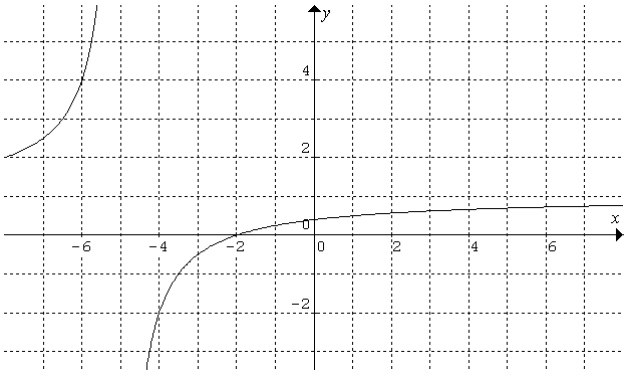
[5] $f(x)=\sqrt{x^3+4}$ [6] $f(x)=(x^2+4x+1)^{\frac{2}{3}}$ [7] $f(x)=\tan(x^4)$ [8] $f(x)=\cot(1-x^2)$

[9] $f(x)=\sec(e^x)$ [10] $f(x)=e^{\sec x}$ [11] $f(x)=\csc(5x+2)$ [12] $f(x)=\sin^2 x$

[13] $f(x)=\cos^3(x^2)$ [14] $f(x)=e^{1-x-4x^2}$ [15] $f(x)=\tan^3(e^{x^3})$ [16] $f(x)=\sqrt{x^3-x}$

[17] $f(x)=\dfrac{(x+3)^3}{(x-5)^4}$ [18] $f(x)=\dfrac{e^{2x}}{(x+1)^3}$ [19] $f(x)=e^{x^2}\cos(2x)$

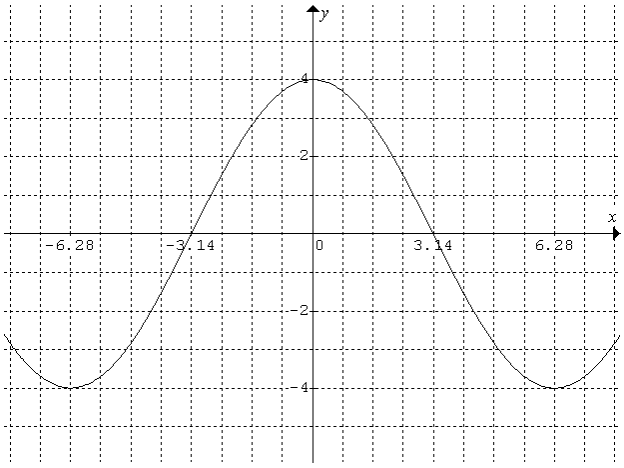
[20] $f(x)=(x-1)^3(x+2)^4$



[21] [a] Find an equation for the tangent line to $f(x)=\dfrac{x+2}{x+5}$ at $x=-2$. Sketch the line on the graph.

[b] Use this tangent line to approximate $f(-1)$. Use a calculator to find the percent error in this approximation.

[c] Find an equation for the normal line to $f(x)=\dfrac{x+2}{x+5}$ at $x=1$. Sketch the line on the graph.



[22] [a] Find an equation for the tangent line to $f(x)=4\cos\dfrac{x}{2}$ at $x=-\pi$. Sketch the line on the graph.

[b] Use this tangent line to approximate $f\left(-\dfrac{3\pi}{4}\right)$. Use a calculator to find the percent error in this approximation.

[c] Find an equation for the normal line to $f(x)=4\cos\dfrac{x}{2}$ at $x=\dfrac{\pi}{4}$. Sketch the line on the graph.