Chain Rule Assignment

1. Find the derivative of the following functions with respect to the independent variable. (You do not need to simplify your final answers here.)

(a) $y=(2x-7)^3$

(b) $y=\dfrac{1}{t^2+3t-1}$

(c) $y=\left(\dfrac{1}{t-3}\right)^2$

(d) $y=\csc^3\left(\dfrac{3x}{2}\right)$

(e) $y=3\sec^2(\pi t-1)$

(f) $y=\sin\sqrt[3]{x}+\sqrt[3]{\sin x}$

(g) $y=x^2\tan\dfrac{1}{x}$

(h) $r=\sec 2\theta\tan 2\theta$

(i) $f(x)=\sqrt[3]{\csc^5 7}$

2. Find the equation of the tangent line (in Taylor Form) for each of the following at the indicated point.

(a) $s(t)=\sqrt{t^2+2t+8}$ at $x=2$

(b) $f(t)=\dfrac{3t+2}{t-1}$ at $(0,-2)$

3. Determine the point(s) in the interval $(0,2\pi)$ at which the graph of $f(x)=2\cos x+\sin 2x$ has a horizontal tangent.

4. Find the second derivative of each of the following functions. Remember to simplify early and often.

(a) $f(x)=2(x^2-1)^3$

(b) $f(x)=\sin(x^2)$

6. If $g(5)=-3$, $g'(5)=6$, $h(5)=3$, and $h'(5)=-2$, find $f'(5)$ (if possible) for each of the following. If it is not possible, state what additional information is required.

(a) $f(x)=\dfrac{g(x)}{h(x)}$

(b) $f(x)=g(h(x))$

(c) $f(x)=g(x)h(x)$

(d) $f(x)=[g(x)]^3$

(e) $f(x)=g(x+h(x))$

(f) $f(x)=(g(x)+h(x))^{-2}$

_____ 14. If $f(x)=\dfrac{1}{\sqrt{x^2+3}}$, find $f'(x)$.

(A) $f'(x)=-\dfrac{x}{\sqrt{(x^2+3)^3}}$

(B) $f'(x)=\dfrac{x}{\sqrt{x^2+3}}$

(C) $f'(x)=-\dfrac{x}{(x^2+3)\sqrt{2x}}$

(D) $f'(x)=-\dfrac{1}{2\sqrt{(x^2+3)^3}}$

(E) $f'(x)=-\dfrac{x^2+3x}{x^2+3}$

_____ 15. If $g(x)=(1-x)^3(4x+1)$, then $g'(x)=$

(A) $-12(1-x)^2$

(B) $(1-x)^2(1+8x)$

(C) $(1-x)^2(1-16x)$

(D) $3(1-x)^2(4x+1)$

(E) $(1-x)^2(16x+7)$

_____ 16. $\dfrac{d}{dx}\left[\left(\dfrac{x^2-3}{5x^2-9}\right)^5\right]=$

(A) $\dfrac{10x(x^2-3)^4(10x^2-17)}{(5x^2-9)^6}$

(B) $\dfrac{-10x(x^2-3)^4(5x^2-16)}{(5x^2-9)^5}$

(C) $\dfrac{-240x(x^2-3)^4}{(5x^2-9)^6}$

(D) $\dfrac{60x(x^2-3)^4}{(5x^2-9)^6}$

(E) $\dfrac{100x(x^2-3)^4}{(5x^2-9)^6}$