Name_____ Date_____ Period

AP Calculus: Chain Rule Practice

Part I: Free Response. Find the first derivative for each, then simplify as much as possible

1. $f(x) = (2x+1)^3$

2. $f(x) = \dfrac{1}{(x^2+4)^2}$

3. $h(x) = \cos 2t^2 + 2\cos^2 t$

4. $h(u) = (3u^2+5)^3(3u-1)^2$

5. $f(y) = \left(\dfrac{y-7}{y+2}\right)^2$

6. $f(r) = (r^2+1)^3(2r+5)^2$

7. $f(x) = 4\cos(\sin 3x)$

8. $g(x) = \sqrt{1+4x^2}$

9. $g(y) = \dfrac{1}{\sqrt{25-y^2}}$

10. $f(x) = \dfrac{1}{(\sin 3x)^{\frac{1}{2}}}$

11. $f(x) = \sqrt[3]{2x^3 - 5x^2 + x}$

12. $h(y) = \cos\sqrt{y^2+1}$

13. $g(x) = \sqrt{1+\cos^2 2x}$

14. $f(x) = \cos^2 x^2$

Part II: Multiple choice

Multiple Choice Chain Rule Practice

#1.

Find the derivative of the function.

$f(t)=(1-3t^4)^3$

A) $f'(t)=-36t^2(1-3t^4)^2$

B) $f'(t)=-4t^3(1-3t^3)^2$

C) $f'(t)=-3t^4(1-3t^4)^2$

D) $f'(t)=-36t^3(1-3t^4)^2$

E) $f'(t)=-36t^3(1-3t^3)^2$

#2.

Find the derivative of the function.

$f(t)=(2+3t)^{\frac{6}{5}}$

A) $f'(t)=\frac{2}{5}(2+3t)^{\frac{1}{5}}$

B) $f'(t)=3(2+3t)^{\frac{1}{5}}$

C) $f'(t)=\frac{18}{5}(2+3t)^{\frac{1}{6}}$

D) $f'(t)=\frac{3}{5}(2+3t)^{\frac{1}{5}}$

E) $f'(t)=\frac{18}{5}(2+3t)^{\frac{1}{5}}$

#3.

Find the derivative of the function.

$f(x)=x^5\sqrt{8-2x}$

A) $f'(x)=\frac{x^4(80-22x)}{2\sqrt{8-2x}}$

B) $f'(x)=\frac{x^4(80+22x)}{2\sqrt{8-2x}}$

C) $f'(x)=\frac{x^4(8-22x)}{2\sqrt{8-2x}}$

D) $f'(x)=\frac{x^4(80-2x)}{2\sqrt{8-2x}}$

E) $f'(x)=\frac{x^4(8+2x)}{2\sqrt{8-2x}}$

#4.

Find the derivative of the function.

$$g(x)=\left(\frac{x+3}{x^2+6}\right)^8$$

A) $g'(x)=\dfrac{8\left(6-6x+x^2\right)}{(3+x)\left(6+x^2\right)}\left(\dfrac{(3+x)}{\left(6+x^2\right)}\right)^8$

B) $g'(x)=\dfrac{8\left(6+6x-x^2\right)(3+x)^7}{\left(6+x^2\right)^9}$

C) $g'(x)=\dfrac{8\left(6-6x-x^2\right)(3+x)^9}{\left(6+x^2\right)^7}$

D) $g'(x)=-\dfrac{8\left(6-6x-x^2\right)(3+x)^7}{\left(6+x^2\right)^9}$

E) $g'(x)=\dfrac{8\left(6-6x-x^2\right)(3+x)^7}{\left(6+x^2\right)^9}$

#5.

Find the derivative of the function.

$$y=\cos\left(6x^4-4\right)$$

A) $y'=-24\sin\left(6x^4-4\right)$

B) $y'=-24x^3\sin\left(6x^4-4\right)$

C) $y'=24\sin\left(6x^4-4\right)$

D) $y'=24x^4\cos\left(6x^4-4\right)$

E) $y'=-6\sin\left(6x^4-4\right)$

#6.

Find the derivative of the function.

$$f(\theta)=\frac{5}{13}\sin^2 5\theta$$

A) $f'(\theta)=\dfrac{5\sin 5\theta\cos 5\theta}{13}$

B) $f'(\theta)=\dfrac{50\sin 5\theta\cos 5\theta}{13}$

C) $f'(\theta)=\dfrac{50\cos 5\theta}{13}$

D) $f'(\theta)=-\dfrac{50\sin 5\theta\cos 5\theta}{13}$

E) $f'(\theta)=\dfrac{50\sin 5\theta}{13}$

#7.

Find the derivative of the function.

$f(t) = 3\sec^2(5\pi t - 3)$

A) $f'(t) = 30\pi \sec^2(5\pi t - 3)\tan(5\pi t - 3)$

B) $f'(t) = 30\sec^2(5\pi t - 3)\tan(5\pi t - 3)$

C) $f'(t) = 5\pi \sec^2(5\pi t - 3)\tan(5\pi t - 3)$

D) $f'(t) = 15\pi \sec^2(5\pi t - 3)\tan(5\pi t - 3)$

E) $f'(t) = 30\pi \sec^2(5\pi t - 3)\tan(3 - 5\pi t)$

#8.

Find an equation to the tangent line for the graph of f at the given point.

$f(x) = (2x^3 + 8)^2, \ (-1, 36)$

A) $y = 72x + 108$

B) $y = 72x - 108$

C) $y = -72x + 108$

D) $y = 36x + 108$

E) $y = 36x - 108$

#9. (Calculator permitted)

Find an equation to the tangent line to the graph of f at the given point.

$f(x) = \tan^4 x, \ \left(\frac{8\pi}{9}, 0.018\right)$

The coefficients below are given to two decimal places.

A) $y = 0.22x + 0.63$

B) $y = -0.22x - 0.63$

C) $y = -0.22x + 0.63$

D) $y = 0.21x + 0.63$

E) $y = 0.21x - 0.63$

#10.

Find the second derivative of the function.

$f(x) = (4x^4 + 6)^5$

A) $f''(x) = 80x^2(6 + 4x^4)^3(18 + 80x^4)$

B) $f''(x) = 80x^2(6 + 4x^4)^3(18 + 76x^4)$

C) $f''(x) = 80x^2(6 + 4x)^3(18 + 76x^4)$

D) $f''(x) = 80x^2(6 + 4x^3)^3(18 + 76x^4)$

E) $f''(x) = 80x^2(6 + 4x^4)^3(18 - 76x^4)$