

1. a.  $[e^{(x^2+1)}[2x]] \sec\left(4x - \frac{\pi}{3}\right) + e^{(x^2+1)} \left[\sec\left(4x - \frac{\pi}{3}\right) \tan\left(4x - \frac{\pi}{3}\right)\right][4]$

b.  $\frac{[3 \tan^2 x \sec^2 x] \tan(x^3) - \tan^3 x [ \sec^2(x^3) ] [3x^2]}{\tan^2(x^3)}$

2. a.  $4 \arctan(2x)$

b.  $\frac{-25}{x^2 \sqrt{x^2+25}}$

3.  $y = -\frac{1}{2}x + \frac{11}{2}$

4.  $(-2, 38); (6, -154)$

5. When  $x = 5, y = -2$ . Implicitly differentiating yields  $\frac{dy}{dt} = \frac{-2x}{3y^2} \left[ \frac{dx}{dt} \right]$

Substituting values:  $\left. \frac{dx}{dt} \right|_{(x,y)=(5,-2), \frac{dy}{dt}=\frac{3}{2}} = -\frac{5}{4}$

6. Note  $f(1) = 4$ ; so  $f^{-1}(4) = 1$  :  $\frac{d}{dx}(f^{-1}(4)) = \frac{1}{f'(f^{-1}(4))} = \frac{1}{f'(1)} = \frac{1}{5}$

7.  $f''(x) = -6x \sin(x^3 + \pi) - 9x^4 \cos(x^3 + \pi)$

8.  $\frac{dy}{dx} = \left( (\csc x)^{\sqrt{x}} \right) \left[ \frac{\ln(\csc x)}{4\sqrt[4]{x^3}} - \sqrt[4]{x} \cot x \right]$

9.  $L(x) = f(1) + f'(1)(x - 1) = 2 - 3(x - 1)$

10. a.  $m = \frac{19 - (-7)}{3 - 1} = 13$       b.  $c = \sqrt{\frac{13}{3}}$