Name:
Sec. 3.4 - The Chain Rule
Math 251

1. Find the derivative of the function

(a) $f(x) = \dfrac{1}{\sqrt[3]{x^2 - 1}}$

$$f(x) = (x^2-1)^{-1/3}$$

$$f'(x) = -\frac{1}{3}(x^2-1)^{-\frac{4}{3}} \cdot \frac{d}{dx}(x^2-1)$$

$$= -\frac{1}{3}(x^2-1)^{-4/3} \cdot 2x$$

(b) $y = \cot^2(\sin\theta)$

$$y = (\cot(\sin\theta))^2$$

$$\frac{dy}{d\theta} = 2(\cot(\sin\theta)) \cdot \frac{d}{d\theta}(\cot(\sin\theta))$$

$$= 2\cot(\sin\theta) \cdot \left[-\csc^2(\sin\theta) \cdot \frac{d}{d\theta}(\sin\theta)\right]$$

$$= 2\cot(\sin\theta) \cdot \left[-\csc^2(\sin\theta) \cdot \cos\theta\right]$$

(c) $y = e^{t\sin(2t)}$

$$\frac{dy}{dt} = e^{t\sin(2t)} \cdot \frac{d}{dt}(t\sin(2t))$$

$$= e^{t\sin(2t)} \cdot \left[t \cdot \frac{d}{dt}(\sin(2t)) + \sin(2t) \cdot \frac{d}{dt}(t)\right]$$

$$= e^{t\sin(2t)} \cdot \left[t \cdot \cos(2t) \cdot 2 + \sin(2t)\right]$$

Notice that we have to use the chain rule again on $\sin(2t)$.