Math 191
Worksheet on The Chain Rule

The Chain Rule states that: \((f \circ g)'(x) = f'(g(x)) \cdot g'(x)\).

1. a) Write the function \(y = e^{-2x+4\sqrt{x}}\) as a composite function \(f \circ g(x)\), where \(f(x) = e^x\). What will \(g(x)\) be?

b) Use the Chain Rule to calculate \(\frac{d}{dx} \left( e^{-2x+4\sqrt{x}} \right)\) and \(\frac{d^2}{dx^2} \left( e^{-2x+4\sqrt{x}} \right)\).

c) Is the function \(y = e^{-2x+4\sqrt{x}}\) increasing or decreasing at \(x = 1\)?

2. a) If \(y = \sin(\pi e^x)\), what is \(\frac{du}{dx}\)?

b) If \(y = \sin(\pi e^{\cos(x)})\), what is \(\frac{du}{dx}\)? (Hint: you will have to use the Chain Rule twice.)