

Name Key

Recitation (Circle) 1:30P 2:30P
 3:30P 4:30P

Use the techniques learned in class to do the following problems and show your work!!!

Problem 1: (4 points) Determine the differential of the following function:

$$f(x) = \frac{7}{x^2} e^{6x^4+1}$$

$$dy = f'(x) dx$$

$$f(x) = (7x^{-2})(e^{6x^4+1})$$

$$f'(x) = (7x^{-2})(e^{6x^4+1} \cdot 24x^3) + (e^{6x^4+1})(-14x^{-3})$$

$$dy = (7 \cdot 24x e^{6x^4+1} - 14x^{-3} e^{6x^4+1}) dx$$

Problem 2: (6 points) Use differentials to approximate $\sqrt[3]{27.1}$. Hint: $\sqrt[3]{27} = 3$.

$$f(x+dx) \approx f(x) + f'(x) dx$$

$$f(x) = \sqrt[3]{x} = x^{1/3} \quad x=27 \quad dx=0.1$$

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

$$f(27+0.1) \approx f(27) + f'(27)(0.1)$$

$$f(27) = 3$$

$$f'(27) = \frac{1}{3} \cdot \frac{1}{9} = \frac{1}{27}$$

$$f(27.1) \approx 3 + \frac{1}{27}(0.1) = \boxed{3.0037}$$