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HOMEWORK: Increments and Differentials, Roots and Powers (Tangent line)

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Name Ethan A. Gonzalez ID A01332014 Date 13/Nov/2024Use differentials to find the approximate value (tangent line) for

1. $\sqrt[3]{26.99}$

$3\sqrt{x}$

$f'(x) = \frac{1}{2x}$

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$\frac{1}{\sqrt[3]{27}} \cdot (0.01) + 3 = 2.99$

$\sqrt[3]{26.99} \approx 2.99$

2. $\sqrt{82}$

\sqrt{x}

$f'(x) = \frac{1}{2\sqrt{x}}$

$\sqrt{81} + \frac{1}{2\sqrt{81}} (1) = 9.055$

$\sqrt{82} \approx 9.055$

3. $(4.9)^2$

$f(x) = x^2$

$2(5)^2 + 2(5)(-1) = 24$

$(4.9)^2 \approx 24$

4. $\frac{1}{\sqrt{4.1}}$

$x^{-\frac{1}{2}}$

$f'(x) = -\frac{1}{2\sqrt{x}}$

$\frac{1}{\sqrt{4}} + \frac{-1}{2\sqrt{4}} (-1) = 0.50$

$\frac{1}{\sqrt{4.1}} \approx 0.50$

Use differentials and increments to solve the following

1. The radius of a circle increments from 15 to 16 centimeters. If A is the area of the circle, estimate the change in the area. (Hint: Area of a circle is $A = \pi \cdot r^2$)

$A = \pi r^2$

$A' = 2\pi r$

$f'(x) = dy$

$2\pi(15) (1)$

$\underline{94.25 \text{ cm}}$

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