

MATH 181 CALCULUS I WORKSHEET 6 ¾ FALL OF 2011

Show all work: NO CREDIT OTHERWISE!

1. Use differentials to approximate $\sqrt{39}$ as a rational number (meaning, of course, a fraction).

2. Use differentials to approximate $\sqrt[3]{53}$ as a rational number .

3. Use differentials to approximate $\sqrt[4]{71}$ as a rational number .

4. Use differentials to approximate $\sqrt{311}$ as a rational number .

5. Find $\frac{dy}{dx}$ when $y = \frac{\sinh(x)}{x^2}$

6. Find $\frac{dy}{dx}$ when $y = \cosh\left(\frac{1}{x^2}\right)$

7. Find $\frac{dy}{dx}$ when $y = \tan(x) \cdot x^3 \cdot e^{3x} \cdot \sinh(3x)$

8. A. Suppose we have a box that is a cube. However, the sides begin to grow or shrink such that the length of the box is growing at a rate of 2 inches per minute ($\frac{\text{in.}}{\text{min.}}$); the width is growing at a rate of $3\frac{\text{in.}}{\text{min.}}$; and, the height is shrinking at a rate of $1.5\frac{\text{in.}}{\text{min.}}$. At what rate is the volume of the box changing when the box has a length of 20 inches; a width of 22 inches and a height of 13 inches?

8. B. What were the dimensions of the box at the moment it was a cube?

9. Suppose a person 6 feet tall is walking away from a wall 17 feet tall that has a light on its top that produces a shadow for the person when he walks away from the wall. Suppose the person is walking away from the wall at a rate of $1\frac{1}{4}$ feet per second. What is the rate of change of his shadow (how fast is his shadow growing or shrinking)?

10. Suppose a person 6 feet tall is walking away from or toward a wall 17 feet tall that has a light on its top that produces a shadow for the person when he walks away from or toward the wall. Suppose the person is walking away from the wall or toward the wall so that his shadow is growing at a rate of 2 feet per second. What is the rate at which the person is walking away from or toward the wall?

11. Suppose a person 6 feet tall is walking away from or toward a wall 17 feet tall that has a light on its top that produces a shadow for the person when he walks away from or toward the wall. Suppose the person is walking away from the wall so that his shadow is shrinking at a rate of 3 feet per second. What is the rate at which the person is walking away from or toward the wall?

12. Suppose we have a cylinder (right circular cylinder) with a radius that is growing at a rate of $3\frac{\text{in.}}{\text{min.}}$ and a height that is shrinking at a rate of $5\frac{\text{in.}}{\text{min.}}$. At what rate is the volume of the cylinder changing when the radius is 5 inches and the height is 10 inches?

13. Suppose we have a cylinder (right circular cylinder) with a radius that is growing at a rate of $4\frac{\text{in.}}{\text{min.}}$ and a volume that is growing at a rate of $2\frac{\text{in}^3}{\text{min}}$. At what rate is the height of the cylinder changing when the radius is 12 inches and the height is 8 inches?