Calculus I	**Name:** _____
Study Guide 16	**Class:** _____
Due Date: _____	**Score:** _____

No Work ⇔ No Points

Use Pencil Only ⇔ Be Neat & Organized

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1. (4 points) Given $z = \sqrt{x^2 + y^2}$, $\dfrac{dx}{dt} = 5$, and $\dfrac{dy}{dt} = 6$, find $\dfrac{dz}{dt}$ when $x = 4$ and $y = 3$.

1. _____

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2. (4 points) A 10 – foot ladder leans against the side of a building. If the top of the ladder begins to slide down at the rate of 2 ft/sec, how fast is the bottom of the ladder sliding away from the wall when the top of the ladder if 8 feet off the ground?

2. _____

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3. Given $f(x) = \dfrac{4}{x+4}$.

   (a) (1 point) Find the domain of $f(x)$ in interval notation.

(a) _____

(b) (2 points) Find $f'(x)$

(b) _____

(c) (3 points) Find the points on the graph of $f(x)$ where $f'(x) = 0$ or undefined.

(c) _____

(d) (2 points) Find $f''(x)$

(d) _____

(e) (3 points) Find the points on the graph of $f(x)$ where $f''(x) = 0$ or undefined.

(e) _____

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4. (4 points) An object is moving along the curve $y = x\sqrt{x}$. At what rate is its distance from the origin changing at the point $(4, 8)$ if its x– coordinate increases at 2 units/sec.

4. _____

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5. Given $f(x) = \dfrac{x^2 + 1}{x}$.

(a) (1 point) Find the domain of $f(x)$ in interval notation.

(a) _____

(b) (2 points) Find $f'(x)$

(b) _____

(c) (3 points) Find the points on the graph of $f(x)$ where $f'(x) = 0$ or undefined.

(c) _____

(d) (2 points) Find $f''(x)$

(d) _____

(e) (3 points) Find the points on the graph of $f(x)$ where $f''(x) = 0$ or undefined.

(e) _____

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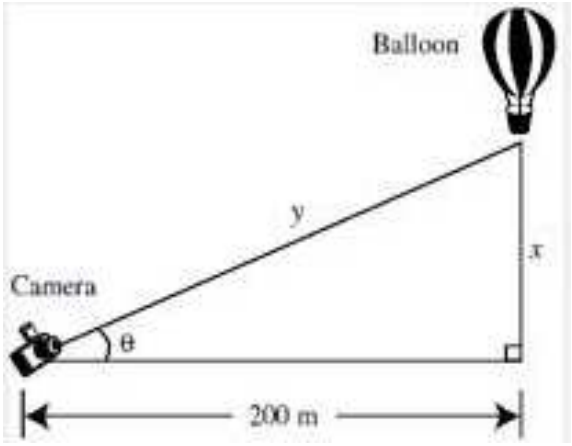
6. (4 points) Use the accompany figure. The balloon is rising vertically at the rate of 25 m/min. Find the rate of change for the angle of elevation θ when the balloon is 100 meters above the ground.



6. _____

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7. (4 points) Suppose a forrest fire spreads in a circle with radius changing at a rate of 5 ft/min. When the radius reaches 200 feet, at what rate is the area of burning region increases?

7. _____

8. Given $f(x) = \sin x + \cos x$ over the interval $[0, 2\pi]$.

(a) (2 points) Find $f'(x)$

(a) _____

(b) (2 points) Find the points on the graph of $f(x)$ where $f'(x) = 0$.

(b) _____

(c) (2 points) Find $f''(x)$

(c) _____

(d) (2 points) Find the points on the graph of $f(x)$ where $f''(x) = 0$.

(d) _____