Calculus I	**Name:**
Study Guide 13 EC	**Class:**
Due Date:	**Score:**

No Work ⇔ No Points

Use Pencil Only ⇔ Be Neat & Organized

Quadratic Approximation of $f(x)$ near a:

$$f(x) \approx f(a) + f'(a)(x-a) + \frac{f''(a)}{2}(x-a)^2$$

Example: Use quadratic approximation to estimate 3.1^4.

Solution: Use $f(x) = x^4$, and $a = 3$, now we find and evaluate the following $f(3) = 3^4 = 81$,

$f'(x) = 4x^3$, and $f'(3) = 4(3^3) = 108$,

$f''(x) = 12x^2$, and $f''(3) = 12(3^2) = 108$,

We continue by plugging these values into the quadratic approximation

$f(x) \approx f(a) + f'(a)(x-a) + \frac{f''(a)}{2}(x-a)^2$

$x^4 \approx 81 + 108(x-3) + \frac{108}{2}(x-3)^2$

Now we simplify to get $x^4 \approx 81 + 108(x-3) + 54(x-3)^2$

If we replace x with 3.1, we get $3.1^4 \approx 81 + 108(3.1-3) + 54(3.1-3)^2$

Perform basic computation, we get $3.1^4 \approx 92.34$

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1. (6 points) Use quadratic approximation to estimate $\sqrt{10}$.

1. _____

2. (6 points) Use quadratic approximation to estimate $\sin 89^\circ$.

2. _____

3. (6 points) Use quadratic approximation to estimate $\tan 46^\circ$.

3. _____

4. (7 points) Use quadratic approximation to estimate $\sqrt[3]{66}$.

4. _____