Section Summary: 2.9

a. **Definitions** We use the tangent line about the point $(a, f(a)$ as an approximation

to the function $f(x)$ when x is "close" to a. The **linearization** is the linear function whose graph is the tangent line:

$$L(x) = f(a) + f'(a)(x - a)$$

The second piece of the sum, $f'(a)(x - a)$, is the "correction" to the function value, because we've moved away from a. The amount by which we have moved is $dx \equiv (x - a)$, called the differential dx; corresponding to that dx is the differential dy:

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

More generally the differential is given by

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

a function of both x and dx. This comes right out of the definition of the derivative, if you think like a physicist:

$$f'(x) = \frac{dy}{dx}$$

b. **Theorems**

c. Properties/Tricks/Hints/Etc.

Physicists in particular are fond of the approximation

$$\sin(\theta) \approx \theta$$

when θ is "small".

d. Summary