## Week Two Thursday 01.07 Free Response

## Spring 2021

Given that y(x) is found by solving the ordinary differential equation

$$\frac{dy}{dx} = y^2 + 9, y(0) = 14,$$

find the estimated value of y(0.5) from a second order Taylor polynomial.

Answer: 834

Hint: Chain rule, if y = y(x), then  $\frac{d}{dx}y^2 = 2y\frac{dy}{dx}$ .

**General Taylor Series:** 

$$f(x+h) = f(x) + f'(x)h + \frac{f''(x)}{2!}h^2 + \frac{f'''(x)}{3!}h^3 + \cdots$$