

**Math 134**  
**Background Quiz**  
**Answers**

1.  $\frac{d}{dx}(x^2 + 2)^3 = 6x(x^2 + 2)^2.$

2.  $\frac{d}{dx}(e^{x^2}) = 2xe^{x^2}.$

3.  $\frac{d}{dx}(\sin(2x)) = 2 \cos 2x.$

4.  $\frac{d}{dx}(\ln(x)) = \frac{1}{x}.$

5.  $\int_0^1 x^3 dx = \frac{1}{4}.$

6.  $\int_{-1}^1 e^x dx = e - \frac{1}{e}.$

7.  $\int (x^2 + 1)^3 2x dx = \frac{1}{4}(x^2 + 1)^4 + C.$

8.  $\int x \sin(x^2) dx = -\frac{1}{2} \cos(x^2) + C.$

9.  $\int \sin^2(x) \cos(x) dx = \frac{1}{3} \sin^3 x + C.$

10. **First Fundamental Theorem of Calculus.** *If  $f$  is continuous on  $[a, b]$ , then*

$$\frac{d}{dx} \int_a^x f(u) du = f(x).$$

**Second Fundamental Theorem of Calculus.** *If  $F$  is differentiable on  $[a, b]$  and  $f(x) = F'(x)$ , then*

$$\int_a^b f(x) dx = F(b) - F(a).$$