

1. Evaluate the following integrals. A sketch of the region may be useful.

(a) $\int_0^1 x^{12} e^{x^{13}} dx$

(b) $\int_0^3 4e^x x + 2e^x x^2 dx$

(c) $\int_{-1}^1 \sqrt{1-x^2} dx$

2. Find the area of the region bounded by the graphs $y = x^2$ and $y = 2x + 3$.

3. Let $f(t) = 2t \cos(t^2)$ and $F(x) = \int_1^x f(t) dt$.

(a) Find the equation of the line tangent to $y = F(x)$ at $x = 3$.

(b) Find a formula for $\frac{d}{dx} (F(x^3))$.