MAT 136 (Calculus I) Prof. Swift

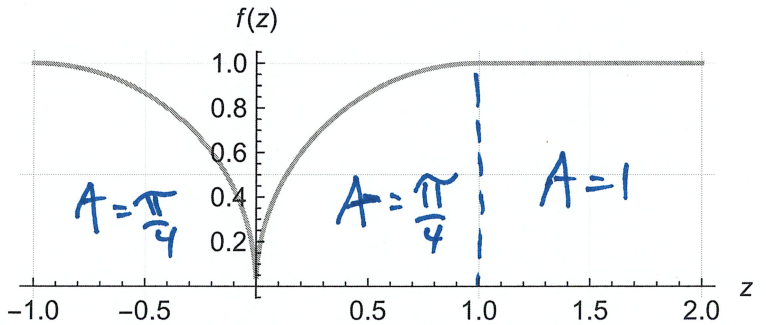
In-class worksheet on the Fundamental Theorem of Calculus

1. $\int \frac{d}{dx}\left[\frac{\sin(x)}{x^2+1}\right] dx =$ $\frac{\sin(x)}{x^2+1} + C$

2. If $g(0) = 0$ and $g'(x) = e^{-x^2}$, then $g(x) =$ $\int_0^x e^{-t^2}\,dt$

3. $\frac{d}{dx}\int_x^{2x} e^{-t^2}\,dt =$ $\frac{d}{dx}\left[g(2x) - g(x)\right] = e^{-(2x)^2}\cdot 2 - e^{-x^2} = 2e^{-4x^2} - e^{-x^2}$

4. Let $g(x) = \int_0^x f(z)\,dz$, where f is the function graphed below.



$g(-1) = -\frac{\pi}{4}$, $g(0) = 0$, $g(1) = \frac{\pi}{4}$, $g(2) = \frac{\pi}{4} + 1$, $g'(1.5) = 1$ $(= f(1.5))$

Note: $g(-1) = \int_0^{-1} f(z)\,dt = -\int_{-1}^{0} f(x)\,dx = -\frac{\pi}{4}$