

1. True. The FTC gives $\int_a^b f(x)dx = F(b) - F(a)$ where F is the antiderivative of f .
2. False. u -substitution undoes the chain rule for differentiation.
3. (a) Use u -substitution with $u = \sin(x)$. The integral is $F(x) = \frac{1}{3} \sin(x)^3 + C$.
(b) First find the velocity by taking the antiderivative of the acceleration.
 $v(t) = \int a(t)dt = \int -10dt = -10t + C$. We are given $v(0) = 10$, so $C = 10$.
Thus $v(t) = -10t + 10$. To find the height, take the antiderivative of velocity.
 $x(t) = \int v(t)dt = \int -10t + 10dt = -5t^2 + 10t + C$. We are given $x(0) = 0$, so
 $x(t) = -5t^2 + 10t$.