B3.

# MATH 1700: Test #3
## Solutions

**[12]** **1.** A solid stretches from $x = 0$ to $x = 3$. The cross-sections of that solid with planes perpendicular to the $x$-axis and $x$ many units away from the origin are squares of edges $2x$ units long. Find the volume of that solid.

***Solution.*** Since each cross-section is a square of side $2x$ its area is $A(x) = 4x^2$. So, the volume of the solid is $\int_0^3 A(x)dx = \int_0^3 4x^2 dx = 4\frac{x^3}{3}\Big|_0^3 = 36$ cubic units.

**[13]** **2.**

**[6]** **(a)** Differentiate $x\sin^{-1}(2x)$.

**[7]** **(b)** Evaluate $\int \frac{e^x}{1+e^{2x}}dx$.

***Solution.***

**(a)** $\left(x\sin^{-1}(2x)\right)' = \sin^{-1}(2x) + x\frac{1}{\sqrt{1-x^2}}2$

**(b)** Use the substitution $u = e^x$, so that $du = e^x dx$:

$\int \frac{e^x}{1+e^{2x}}dx = \int \frac{1}{1+u^2}du = \tan^{-1}u + c = \tan^{-1}e^x + c$.