MATH3175 HW1

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1. 2.1.16

   Solution:

   $\rightarrow$:
   Suppose f is onto. WTS there exists a function g s.t. $f \circ g = 1_B$
   We can construct an g by following steps:
   Let $y \in B$. Then $\exists x \in A$ s.t. $f(x) = y$
   Choose one of such x's call it x_y.
   Set $g(y) = x_y$
   Then $\forall y_b \in B$, $f \circ g(y_b) = f(g(y_b)) = f(x_{y_b}) = x_y = 1_B(y_b)$
   Then there exists a function g s.t. $f \circ g = 1_B$

   $\leftarrow$:
   Suppose there exists a function g s.t. $f \circ g = 1_B$. WTS f is onto.
   Let $y \in B$, then $g(y) \in A$ and $(f \circ g)(y) = y$