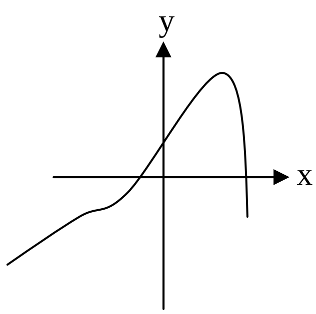
Assignment 1 MATH 1500

(Follows Unit 4 in the manual)

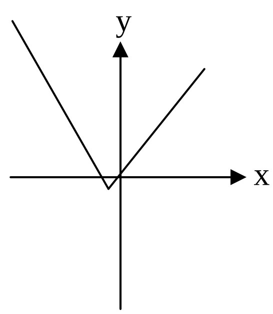
Values

[6] 1. Determine which of the following graphs is the graph of a function of the type $y = f(x)$. Give reasons for your answers.

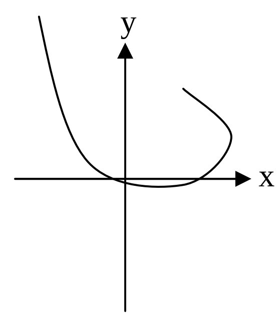
(a)



(b)



(c)



[6] 2. For each of the following functions, find the domain and the range.

(a) $f(x) = \dfrac{x^2+2}{x^2-1}$ (b) $f(x) = \sqrt{4-x^2}$ (c) $f(x) = \dfrac{1}{1-\sqrt{x-2}}$

[5] 3. Given $f(x) = \dfrac{1}{1-x}$ and $g(x) = \sqrt{x-1}$, find the composite functions $f \circ g$ and $g \circ f$. Find also the domains of $f \circ g$ and $g \circ f$.
[cf. Section 1.3]

[7] 4. Given the function $f(x) = \dfrac{1-2x}{1+x}$

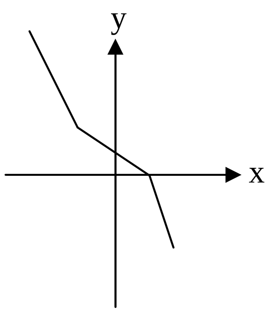
(a) Show that $f(x)$ is one to one

(b) Find the inverse function $f^{-1}(x)$.

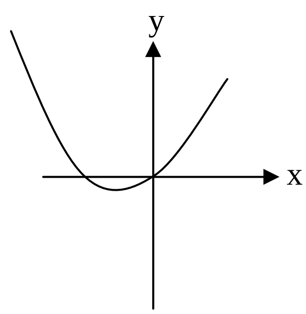
(c) Find the domain and the range of $f^{-1}(x)$.

[6] 5. Each of the following graphs is the graph of a function of the type $y = f(x)$. For which of these functions does an inverse function $y = f^{-1}(x)$ exist? Give reasons for your answers.

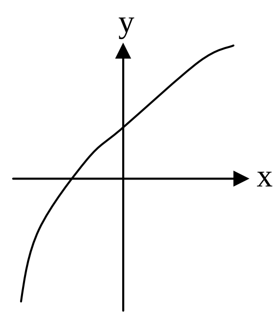
(a)



(b)



(c)



[8] 6. Each of the following functions is invertible. Find the inverse function $f^{-1}(x)$
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(a) $y = 1 - \dfrac{2}{x}$

(b) $y = \dfrac{1+e^x}{1-e^x}$

[6] 7) Pictured on the right is the graph of a discontinuous function $f(x)$. Use this graph to determine the following limits for $f(x)$. [cf. Section 2.2]

(a) $\lim\limits_{x \to 1^-} f(x)$

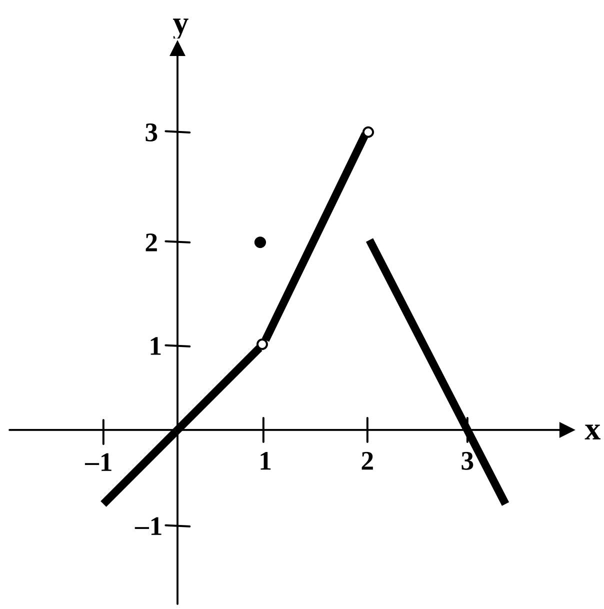
(b) $\lim\limits_{x \to 1^+} f(x)$

(c) $\lim\limits_{x \to 1} f(x)$

(d) $\lim\limits_{x \to 2^-} f(x)$

(e) $\lim\limits_{x \to 2^+} f(x)$

(f) $\lim\limits_{x \to 2} f(x)$



[20] 8. Evaluate each of the following limits or explain why it does not exist.
[cf. Section 2.3]

(a) $\lim_{x \to -3} \frac{x^2 - x - 12}{x + 3}$

(b) $\lim_{x \to 4} \frac{\sqrt{x} - 2}{x^2 - 16}$

(c) $\lim_{x \to 0} \frac{x^2 + 3x}{(x+2)^2 - (x-2)^2}$

(d) $\lim_{x \to 1} \frac{x^2 - 1}{\sqrt{x+3} - 2}$

[6] 9. Use the Squeeze Theorem to find $\lim_{x \to 0} x^2 \cos \frac{1}{x}$.

Total = 70