

B16.

MATH 1500: Test #1 (Fall 2010)**Solution; marking scheme**

Always give (brief) justification, and show your work.

[5] 1. Find the domain of the function $\sqrt{(3-2x)}$. Write your final answer in terms of intervals.

Solution. $3-2x \geq 0$, so $3 \geq 2x$, so $\frac{3}{2} \geq x$; so the domain is $(-\infty, \frac{3}{2}]$

[10] 2. Which of the following functions is even, which is odd, which is neither even nor odd? Do not forget to justify your answers (show your work).

$$(a) f(x) = x^2 + 2^x$$

$$(b) g(x) = \frac{x - x^7}{x^{101} + 2x^3}$$

$$(c) h(x) = \frac{x - x^7}{x^{2010} + x^2}$$

$f(-x) = x^2 + 2^{-x}$ and since this is neither $f(x)$ nor $-f(x)$ this function is neither even nor odd.

$$g(-x) = \frac{-x + x^7}{-x^{101} + 2x^3} = \frac{x - x^7}{x^{101} + 2x^3} = g(x), \text{ so this is an even function.}$$

$$h(-x) = \frac{-x + x^7}{x^{2010} + x^2} = -h(x), \text{ so this is an odd function.}$$

[10] 3. Evaluate the following limits:

$$(a) \lim_{x \rightarrow 2} \frac{x^2 - 4}{(x^2 - x - 6)}$$

$$(b) \lim_{x \rightarrow 2} \frac{x^2 - 4}{(x^2 + x - 6)}$$

$$(a) \lim_{x \rightarrow 2} \frac{x^2 - 4}{(x^2 - x - 6)} = \frac{0}{-4} = 0$$

$$(b) \lim_{x \rightarrow 2} \frac{x^2 - 4}{(x^2 + x - 6)} = \lim_{x \rightarrow 2} \frac{(x-2)(x+2)}{(x-2)(x+3)} = \lim_{x \rightarrow 2} \frac{(x+2)}{(x+3)} = \frac{4}{5}.$$