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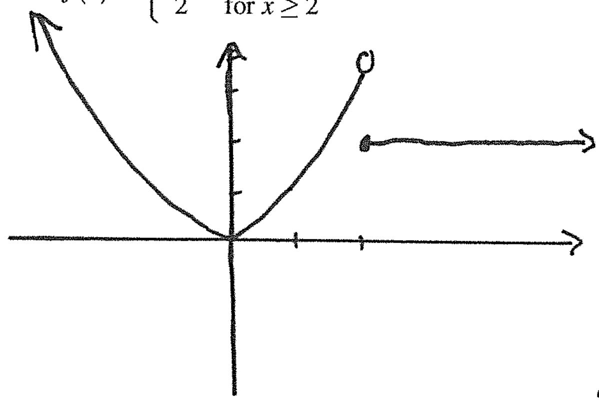
Quiz 1

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §23.1 #21 *(3 marks)* Graph the function and determine the values of x for which the functions are continuous. Explain.

$$f(x) = \begin{cases} x^2 & \text{for } x < 2 \\ 2 & \text{for } x \geq 2 \end{cases}$$



$f_1(x) = x^2$, $f_2(x) = 2$ are continuous everywhere since they are both pol.

at $x = 2$, $f(x)$ is not continuous since $\lim_{x\to 2} f(x) = \text{D.N.E.}$ since

$\lim_{x\to 2^-} f(x) = 4$, $\lim_{x\to 2^+} f(x) = 2$

$\therefore f(x)$ continuous on $\mathbb{R} \setminus \{2\}$

Question 2. §23.1 #38 *(3 marks)* Evaluate the indicated limits by direct evaluation. Change the form of the function where necessary.

$$\lim_{x\to 1/3} \frac{3x-1}{3x^2+5x-2} = \lim_{x\to 1/3} \frac{\cancel{3x-1}}{(\cancel{3x-1})(x+2)} = \lim_{x\to 1/3} \frac{1}{x+2} = \frac{1}{1/3+2} = \frac{3}{7}$$

Question 3. §23.1 #47 *(2 marks)* Evaluate the indicated limits by direct evaluation. Change the form of the function where necessary.

$$\lim_{t\to\infty} \frac{\sqrt{t^2+16}}{t+1} \frac{(\frac{1}{t})}{(1/t)} = \lim_{t\to\infty} \frac{\sqrt{(t^2+16)(\frac{1}{t^2})}}{\frac{t}{t}+\frac{1}{t}} = \lim_{t\to\infty} \frac{\sqrt{1+\frac{16}{t^2}}^{\to 0}}{1+\frac{1}{t}^{\to 0}} = \frac{\sqrt{1}}{1} = 1$$

Question 4. §23.1 #64 *(2 marks)* Explain why

$$\lim_{x\to 0^+} 2^{1/x} \neq \lim_{x\to 0^-} 2^{1/x}.$$

$\text{LHS} = \lim_{x\to 0^+} 2^{1/x} = \infty$ DNE

x	1	0.1	0.01	0.001	$\to 0$
$2^{1/x}$	2^1	2^{10}	2^{100}	2^{1000}	$\to \infty$

$\text{RHS} = \lim_{x\to 0^-} 2^{1/x} = 0$

x	-1	-0.1	-0.01	-0.001	$\to 0$
$2^{1/x}$	$1/2$	$1/2^{10}$	$1/2^{100}$	$1/2^{1000}$	$\to 0$