PRACTICE MIDTERM 1 (BORCHERDS) - ANSWER KEY

PEYAM RYAN TABRIZIAN

(1) $[0, 2]$

(2) Looks like the graph of $x^2 - 2x = (x-1)^2 - 1$, except you flip it across the y-axis on the interval $[0, 2]$.

(3) $f^{-1}(x) = \sqrt[3]{\ln(x-1)}$

(4) See me in office hours if you don't know how to do this! (it'll be easier to draw the picture for you)

(5) $\frac{3}{2}$

(6) $\frac{\epsilon}{5} = \frac{0.01}{5} = 0.002$

(7) Discontinuous at 3 (but continuous at 1)

(8) $\frac{(3)(4)}{(1)(2)} = 6$

(9) $\frac{f(x) - f(3)}{x - 3}$; $\lim_{x \to 3} \frac{f(x) - f(3)}{x - 3}$

(10) 1; $y = x + 1$

(11) Differentiable everywhere! $f'(x) = 3x^2$ when $x > 0$, 0 when $x = 0$, $-3x^2$ when $x < 0$

(12) $y' = e^{x+1} + \frac{1}{2\sqrt{x}} - \frac{1}{2}x^{-\frac{3}{2}}$

(13) $\ln(3)$

(14) $e^x \left(x^{\frac{3}{2}} + \frac{3}{2}\sqrt{x} + x + 1 \right)$

(15) $\frac{2x+3}{\left(1 + \frac{1}{x}\right)^2}$

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