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_____   _____   _____
STUDENT NAME   STUDENT ID   MARKS

YOU ARE GIVEN 30 MINUTES TO FINISH ALL QUESTIONS; PLEASE SHOW ALL YOUR WORK TO GET FULL CREDITS.

1. Answer the following questions.

[1]   (a) Evaluate $f(5)$, if the function $f(x) = \begin{cases} \sqrt{x-1}, & \text{if } x > 3 \\ x^2 - 1, & \text{if } x \le 3. \end{cases}$

[2]   (b) Find the domain of the function $f(x) = \sqrt{4 - 2x}$.

[2]   (c) Find the range of the function $f(x) = x^2 - 4x + 5$.

[3]   2. Find the exactly value of the expression $2^{\log_2 3 + \log_2 5}$.

3. Solve the following equations.

[3]   (a) $2^{x^2 - 2x} = \left(\frac{1}{4}\right)^{x-1}$.

[2]   (b) $\ln(\ln x) = 0$.

4. It has been observed that the MATH 1520 midterm marks P is a function of the number of hours t students spend studying every week. Using *JUMP SE 5.0* (a statistical software), we decided that this functions is given by

$$P = P(t) = 100 - 80e^{-t/3}$$

where P and t are measured in percentage (out of 100) and hours, respectively.

[1]   (a) What do you expect if you don't study at all?

[3]   (b) How many hours a week should you study if you want 60% on your midterm? (*You may leave your answer in logarithmic form.*)

[8] 5. Consider the graph on the right
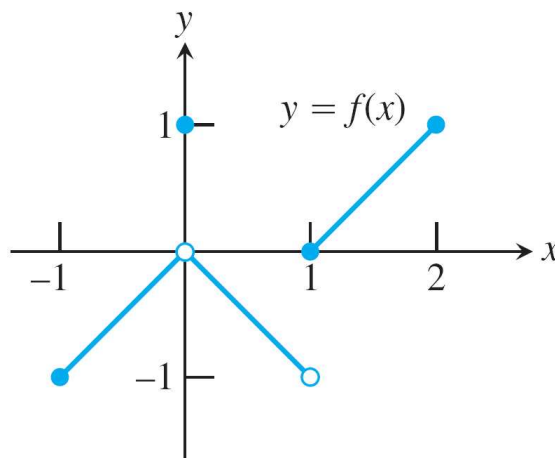
Find each of the following where possible, writing "NONE" if it doesn't exist.

(a) $\lim\limits_{x \to 0^-} f(x) =$ _____

(e) $\lim\limits_{x \to 1^-} f(x) =$ _____

(b) $\lim\limits_{x \to 0^+} f(x) =$ _____

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

(c) $\lim\limits_{x \to 0} f(x) =$ _____

(g) $\lim\limits_{x \to 1} f(x) =$ _____

(d) $f(0) =$ _____

(h) $f(1) =$ _____