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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.

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1. Answer the following questions.

[1] (a) Evaluate
$$f(-2)$$
, 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 $f(x) = \sqrt{10 - 2x}$.

[2] (c) Find the range of the function $f(x) = x^2 - 4x + 1$.

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

3. Solve the following equations.

[3] (a)
$$2^{x^2 - 2x} = \left(\frac{1}{4}\right)^{x - 5}$$
.

[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?
- (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) $\lim_{x \to 1^{-}} f(x) =$ ______
 (e) $\lim_{x \to 2^{-}} f(x) =$ ______

 (b) $\lim_{x \to 1^{+}} f(x) =$ ______
 (f) $\lim_{x \to 2^{+}} f(x) =$ ______

 (c) $\lim_{x \to 1} f(x) =$ ______
 (g) $\lim_{x \to 2} f(x) =$ ______

 (d) f(1) = ______
 (h) f(2) = ______