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MATH1061 — DISCRETE MATHEMATICS
First Semester Examination, June 2001 (continued)

9. (6 marks) A bag contains 11 distinct letters: A, B, C, D, E, F, G, H, I, J, K.
- (a) How many different ways are there to choose 3 letters all at once from the bag of 11 letters?

- (b) Now the 3 letters are picked one at a time, and the order of choice is noted, as a 3-letter "word". How many different 3-letter "words" can be chosen from the bag of 11 letters?

- (c) There are three vowels in the bag (A, E and I). When 3 letters are chosen from the bag of 11 letters all at once, what is the probability that exactly one of the 3 letters is a vowel?

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10. (8 marks)

Let $X = \{x \in \mathbb{Z} \mid -1 \leq x \leq 4\}$ and $Y = \{y \in \mathbb{Z} \mid 0 \leq y \leq 5\}$.

Define $f : X \rightarrow \mathbb{Z}$ by $f(x) = |x| + 1$ and $g : Y \rightarrow \mathbb{Z}$ by $g(y) = \lfloor \frac{y}{2} \rfloor + 1$.

- (i) The range of f is

- (ii) The range of g is

- (iii) Is f one-to-one? Explain your answer.

- (iv) Is Y a subset of the range of f ? Explain your answer.

- (v) Calculate $(g \circ f)(2)$ and also $(f \circ g)(2)$.

- (vi) Write general expressions, in terms of x , for the functions $(f \circ g)(x)$ and $(g \circ f)(x)$.