

Math SL PROBLEM SET 1

1. **(F2.4 - R) (CI)** Given the function $f(x) = x^2 - 2x - 8$, determine the: **(Cirrito 2.4.2, p44)**
 - a. values of $f(3)$ and $f(5)$,
 - b. average rate of change between $f(3)$ and $f(5)$,
 - c. vertex,
 - d. zeroes,
 - e. range, if the domain were $-4 \leq x \leq 5$.

2. **(SP5.5 - R) (CA)** A box contains 7 blue marbles and 5 yellow marbles. Mark takes out three marbles, one after another, without replacement. Determine **(Oxford 3.5, p89)**
 - a. the probability that Mark takes out three blue marbles;
 - b. the probability that Mark takes out exactly 2 yellow marbles.
 - c. Given that Mark has at least one blue marble, find the probability that Mark has taken out exactly 2 yellow marbles.

3. **(F2.1, 2.3 - R) (CI)** The functions f and g are: $f(x) = e^{2x}$ for all x and $g(x) = \frac{3}{2} \ln(x)$ for $x > 0$. **(Cirrito 5.4.1, p148; Cirrito 5.4.2, p157)**
 - a. State the ranges of both $f(x)$ and $g(x)$.
 - b. Explain why both functions have inverse functions.
 - c. Find expressions for both $f^{-1}(x)$ and $g^{-1}(x)$.
 - d. Use Symbolab to simplify the expressions for $f \circ g(x)$ and for $g \circ f(x)$.
 - e. Solve the equation $f \circ g(x) = g \circ f(x)$.

4. **(F2.2, 2.5 - R) (CI)** Given the function $f(x) = 2 + \frac{1}{2x-5}$, $x \neq \frac{5}{2}$; **(Cirrito 5.3.5, p144)**
 - a. Write down the equation of each of the asymptotes,
 - b. Determine the value of each of the intercepts,
 - c. Sketch the curve of f for $-3 \leq x \leq 5$, showing the asymptotes and intercepts.

5. **(T3.6 - R) (CA)** Mr. S is about to go zip lining off a cliff! He notices that the angle of depression of the zip line is 14° . If the starting platform is 100 m high and the finishing platform is 25 m high, **(Cirrito 9.5, p290)**
 - a. How long is the zip line?
 - b. How much “ground distance” is there between the starting platform and the finishing platform?
 - c. You had to make an assumption to answer Q(a) and Q(b). Now assume that this assumption was NOT true and the ground “sloped away” at an angle of 6° . Now re-determine the (i) length of the zip line and (ii) the ground distance between the two platforms.