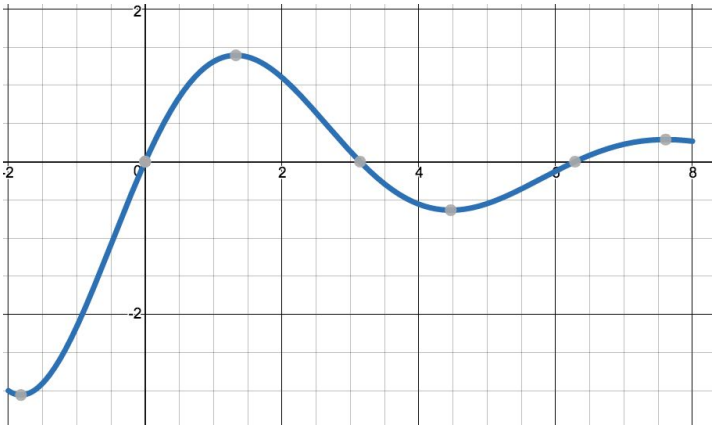
Math SL PROBLEM SET 47

Section A (Skills/Concepts Consolidation)

1. **(C6.4 - N) (CI)** The following equations represent equation of derivatives. You are asked to find the function that was derived in order to produce this derivative - in other words, you are finding an **antiderivative** and the process is called **anti-differentiation**. **(Cirrito 22.1, p723)**

   a. $f`(x) = 2x + 4$
   b. $f`(x) = 3x^2 - 4x + 2$
   c. $f`(x) = 8x^3 + 6x^2 - 2x + 7$

2. **(C6.3 - N) (CI)** Here is a graph of the derivative of a function. Sketch the original function. **(Cirrito 20.2, p649)**



3. **(T3.6 - N) (CA)** Determine the possible area(s) of a triangle wherein AB = 10 cm, BC = 7 cm and $\angle CAB = 32°$. Draw diagram(s) to support your answer(s). **(Cirrito 9.5.2, p294)**

4. **(CA6.3 - N) (CI)** For $f(x) = 2x^3 - 9x^2 + 12x - 2$, determine: **(Cirrito 20.2, p649)**

   a. the intervals of increase and decrease of f,
   b. the maximum and/or minimum values of f,
   c. the intervals of concavity of f,
   d. any inflection point(s) of f.
   e. Then, sketch a graph of f. Then use your calculator and graph f and compare.
   f. Determine the equation of the anti-derivative of $f(x)$.

5. **(CA6.3 - N) (CI)** Prepare graphs of the following functions. Then, draw what the graphs of their derivatives must look like. Then, predict the equation of the derivative of these functions, on the basis of the graphs of the derivatives. **(Cirrito 20.2, p649)**

   a. $g(x) = \sin(x)$ (Draw 2 periods) b. $g(x) = \cos(x)$ (Draw 2 periods)

6. **(A1.2 - N) (CI)** Given that $\log_2(5) = K$ and $\log_2(6) = M$ and $\log_2(7) = N$, find expressions in any of K, M, and N for the following: **(Oxford, Chap 4N, p124)**

   a. $\log_2(180)$ b. $\log_2\left(\frac{125}{7}\right)$ c. $\log_8(1.96)$

Math SL PROBLEM SET 47

Section B (Skills/Concepts Practice)

7. **(SP5.2 - R) (CA)** Here are the results of last year's IB scores from the 2018 graduating class from Juan Fine High School: **(Oxford 8.3, p260)**

Score	1	2	3	4	5	6	7
Number of students	0	2	2	8	12	6	1

   a. Explain why this example illustrates a **discrete** data set.
   b. **(CI)** Set up a calculation in order to determine the average score from these students.
   c. Determine the mean, median, variance and standard deviation of the scores.
   d. How probable is it that a randomly student from this class scored 5 or more?
   e. Draw a frequency histograph for this distribution.

8. **(SP5.7 - N) (CA)** Here is a probability distribution of a discrete random variable (say the number of students and their AP scores in the AP US History course): **(Oxford 15.1, p520)**

X (score)	0	1	2	3	4	5
P(x)	0.08	0.40	0.24	0.15	0.08	0.05

   a. Use the equation $E(X) = \sum x\,P(x)$ to determine the **expected value** of the scores.

   b. Use the equation $var(X) = \sigma^2 = \sum (x-\mu)^2 P(x)$ to determine the **variance** and hence the **standard deviation** of the scores.
   c. Use your calculator and lists to perform the same calculations.
   d. Draw a frequency histograph for this distribution.

9. **(SP5.7 - N) (CI)** The discrete random variable X has a probability density function defined by the rule $P(X = x) = k(25 - x^2)$, for $x \in \{1,2,3,4,5\}$. **(Oxford 15.1, p520)**

   a. Create a probability distribution table and hence find the value of k.
   b. Find E(X) and Var(X)
   c. Find P($1 < x \leq 3$)
   d. Find P($x = 3 \mid x \geq 2$)