Math SL PROBLEM SET 77

1. **(CA6.2 - N) (CI)** Determine the equations of the derivatives of the following functions and hence, determine the slope of the curve at the given point.

   (Oxford 7.3, p208)

   a. $f(x) = \frac{3x-2}{2x-5}$ at the point where $x = 1$
   b. $g(x) = \frac{x}{e^x - 1}$ at the point where $x = 2$
   c. $h(x) = \frac{sin(x)}{x}$ at the point where $x = \frac{2\pi}{3}$

2. **(SP5.2 - R) (CI)** There exists a set of five positive integers that has a mean of 5, a median of 5, and a single mode of 8. Determine the value of each of the five numbers.

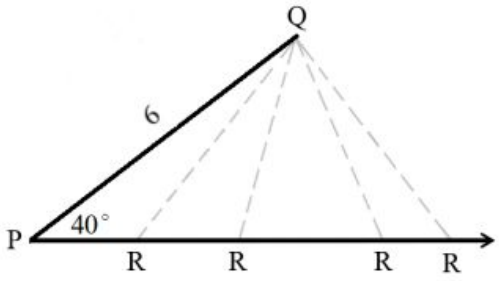
   (Cirrito 13.3, p474)

3. **(T3.5 - R) (CI)** Solve the equation $2\cos^2(x) + \sin(x) = -1$ on the interval $0 \leq x \leq 2\pi$.

   (Cirrito 10.4, p351)

4. **(T3.6; SP5.4 - R) (CA)** As shown in the diagram below, angle QPR equals 40° and PQ = 6. If the length of QR is a randomly chosen real number between 0 and 6, then what is the probability that it is possible to construct two different triangles?

   (Cirrito 9.5.2, p294)

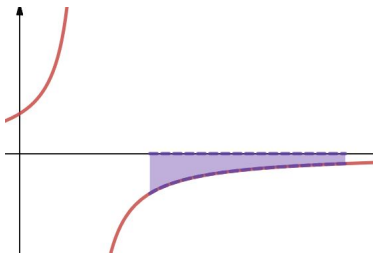


5. **(C6.3 - R) (CI)** For the function $y = x^4 - 2x^3$;

   (Cirrito 20.2, p649)

   a. find all stationary points and inflection points of the function,
   b. classify the stationary points,
   c. state its end behaviours,
   d. sketch the function.

6. **(C6.5 - E) (CI)** The diagram shows part of the graph of $y = \frac{1}{1-x}$. The area of the shaded region between $x = 2$ and $x = k$ is exactly -ln4 units. Find the exact value of k.



   (Cirrito 22.5, p748)

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7. **(CA6.2, CA6.3 - E) (CI)** Given the function $g(x) = \frac{x}{x^2+1}$, determine the x coordinates of the stationary points and inflection points. Predict the end behaviour of the function and prepare a sketch.

(Cirrito 20.2, p649,; Cirrito 20.3, p672)

8. **(CA6.3 - R) (CI)** Here is a sketch of two different functions, each of which represent the graph of the **derivative** of some function. For each graph, sketch both the (i) anti-derivative (so in other words, the original function) as well as the derivative of the derivative graph (so in other words the second derivative)

(Cirrito 20.2, p649, Cirrito 20.3, p672)