Math SL PROBLEM SET 76

1. **(SP5.3 - R) (CA)** The events G and H are **independent** and it is given that P($G \cap H$ `) = 0.12 and P($G$ ` $\cap H$) = 0.42. **(Oxford 3F, p84)**

   a. Draw a Venn diagram to represent the events G and H.
   b. Let P($G \cap H$) = x. Find the two possible values of x.

2. **(T3.2 - R) (CI)** Given that cos(x) = ¼ and that $\frac{3\pi}{2} \leq x \leq 2\pi$, determine the values of: **(Oxford 13.1, p448)**

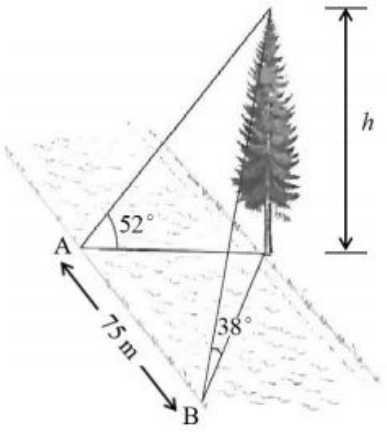
   a. sin(x) b. sin(2x) c. tan(2x) d. sin(4x)

3. (**C6.3 - N**) (**CA**) Use Symbolab to take the following derivatives. Comment on any patterns you observe: **(Cirrito 19.5.3, p638)**

   a. $f(x) = \frac{2x-3}{x+1}$ b. $g(x) = \frac{sin(x)}{x}$ c. $h(x) = \frac{e^{2x}}{x^2}$

4. (**A1.1 - R**) (**CA**) Find all pairs of numbers, a and b, such that 3, a, b are consecutive terms in a geometric sequence, and a, b, 9 are consecutive terms in an arithmetic sequence. **(Cirrito 8.2.3, p261)**

5. (**T3.6 - R**) (**CA**) The diagram shows a river with parallel banks (edges). A tree on a bank of the river is **directly opposite** from point A on the opposite bank of the river. Maria wishes to compute the height of the tree. From point A she measures the angle of elevation to the top of the tree to be 52°. She then walks 75 metres along the bank to point B where she measures the angle of elevation to the top of the tree to be 38°. Determine the height of the tree to three significant figures.



(Cirrito 9.6, p307)

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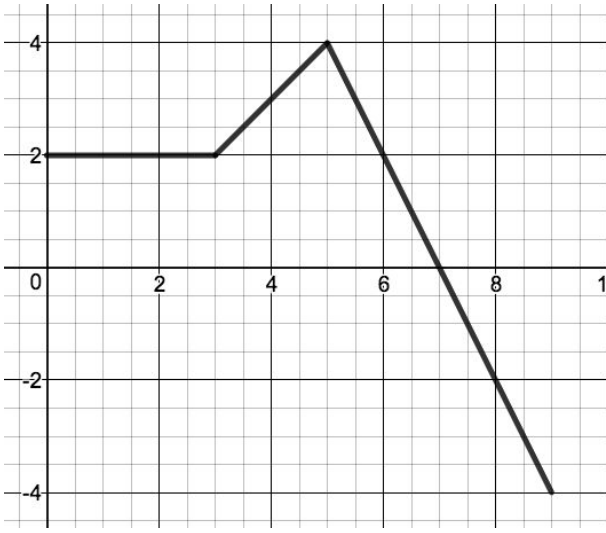
6. (**T3.5 - R**) (**CI**) Given the function $f(x) = 2\sin^2(x) - \sin(x)$ on the domain of $-\pi \leq x \leq \pi$.

(Cirrito 10.4, p351)

   a. Solve for the zeroes of $f(x)$, i.e. solve $2\sin^2(x) - \sin(x) = 0$.
   b. Find the equation of the line normal to $f(x)$ at the first positive zero.

7. (**C6.5 - N**) (**CI**) Determine the value of the following definite integrals, given the graph of the function $y = g(x)$.

(Cirrito 22.5, p748)



   a. (i) $\int_0^3 g(x)dx$ (ii) $\int_0^6 g(x)dx$ (iii) $\int_0^9 g(x)dx$
   b. (i) $\int_0^6 (g(x) + 3)\,dx$ (ii) $\int_0^6 -3g(x)dx$ (iii) $\int_0^6 g(3x)dx$

8. **(V4.2 - R) (CA)** The line L_1 has a vector equation $r = \begin{pmatrix} 2 \\ -3 \\ -3 \end{pmatrix} + t \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix}$. A second line, L_2, is perpendicular to L_1 and is represented by $r = \begin{pmatrix} 3 \\ 12 \\ 5.5 \end{pmatrix} + q \begin{pmatrix} 7 \\ x \\ 1 \end{pmatrix}$.

(Cirrito 12.7, p444)

   a. Show that $x = -3$.
   b. Find the coordinates of the intersection point of L_2 and L_1.
   c. Determine the measure of the angle between L_1 and L_2.