Math SL PROBLEM SET 79

1. **(CA6.2 - R) (CI)** Differentiate the following: **(Cirrito 19.3, p618)**

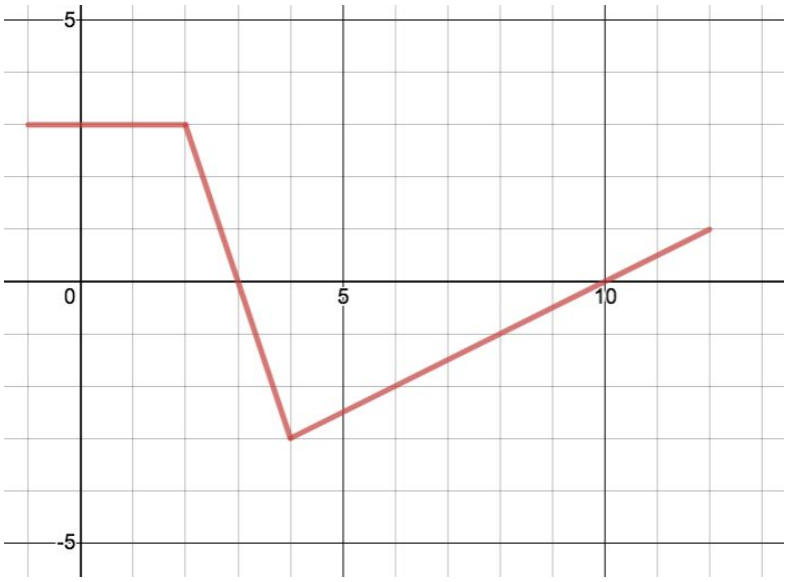
   a. $f(x) = \sqrt{x^2 + 4}$ b. $g(x) = (2x - 1)\cos(2x)$ c. $h(x) = \frac{x^2 - 1}{x^2 + 1}$

2. **(CA6.5 - N) (CI)** Determine the values of the following, given the graph of $y = g(x)$. **(Cirrito 22.5, p748)**

   a. i.) $\int_{-1}^{3} g(x)\,dx$ ii.) $\int_{3}^{8} g(x)\,dx$ iii.) $\int_{-1}^{12} g(x)\,dx$

   b. i.) $\int_{-1}^{12} (g(x) + 2)\,dx$ ii.) $\int_{-1}^{12} 2\,g(x)\,dx$ iii.) $\int_{-1}^{12} -g(x)\,dx$

   c. i.) $g'(0) = ?$ ii.) $g'(3) = ?$ iii.) $g'(10) = ?$



3. **(T.3.2 - R) (CI)** Solve the following trigonometric equations on the domain of $-2\pi \leq x \leq 2\pi$. **(Cirrito 9.1.2, p273)**

   a. $2\cos(x) + \sqrt{3} = 0$ b. $2\sin(2x) - \sqrt{2} = 0$ c. $3\tan^2(x) - 1 = 0$

4. **(CA6.4 - N) (CI)** Evaluate the following integrals: **(Oxford 9F, p302)**

   a. $\int_{-1}^{1} x^2\sqrt{x^3 + 1}\,dx$ b. $\int_{-\pi}^{\pi} cos(x)\sqrt{sin(x)}\,dx$ c. $\int \frac{e^x}{1 + e^{2x}}\,dx$

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5. **(CA6.5 - E) (CI)** Given the two functions of $f(x) = \sin(2x)$ and $g(x) = \sin(x)$ and limiting ourselves to the interval of $0 < x < \pi$:

(Cirrito 22.5, p760)

   a. Sketch the two functions on this interval.
   b. Find the area of the region between the two curves on this interval.

6. **(CA6.3 - E) (CI)** Let $g(x) = \frac{ln(x)}{x^2}$ for $x > 0$. Use the quotient rule to show that $g'(x) = \frac{1 - 2ln(x)}{x^3}$. The graph of g has a maximum point at A. Find the x-coordinate of A.

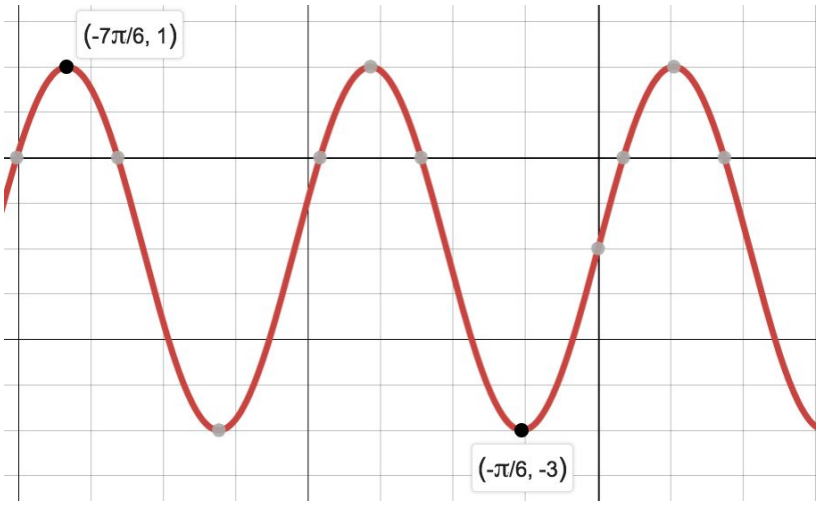
(Cirrito 20.2, p649)

7. **(T3.5 - R) (CA)** Given triangle ABC, side $a = 12.1$ cm and side $b = 16.8$ cm and the angle at vertex A measures 23°. Determine the measure of side c and the angle at vertex C.

(Cirrito 9.5.2, p294)

8. (**T3.5, C6.1, C6.2, C6.5 - E**) **(CI)** You are given a graph of the function, $g(x) = A \sin(Kx) + D$.

(Cirrito 10.3, p337; 20.2, p649; 22.5, 748)



   a. Find the values of A, K and D. Show/explain your work.
   b. Write a cosine equation for $g(x)$.
   c. The first two positive zeroes of g(x) are $x_1 = a$ and $x_2 = b$. Find the values of a and b.
   d. Determine the equation of the line that is tangent to $g(x)$ at x_1.
   e. Evaluate $\int_a^b g(x)dx$