Math SL PROBLEM SET (2*x* - 4)

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1. **(F2.1 - R)** **(CI)** Given the function $f(x) = 2x - 4$, **(Cirrito 2.3, p28; Cirrito 5.4, p148)**

   a. Determine the domain of $f(x)$ if the range of the function was $-12 < f(x) \leq 10$.
   b. Find the equation of the inverse function, $f^{-1}(x)$.
   c. Determine the equation of $f^{-1} \circ f(x)$ as well as $f \circ f^{-1}(x)$.
   d. Determine the equation of a line that goes through $A(-2,6)$ and is perpendicular to $f(x)$.

2. **(C6.2 - R,N)** **(CI)** Determine the derivatives of the following functions. **NOTE: Use Symbolab to do the questions in 2b**. **(Cirrito 19.3, p618)**

   a. i. $y = \sin(2x - 4)$ ii. $y = \ln(2x - 4)$ iii. $y = \tan(2x - 4)$ iv. $y = e^{2x-4}$
   b. i. $y = (2x - 4)\sin(x)$ ii. $y = (2x - 4)\ln(x)$ iii. $y = (2x - 4)\tan(x)$ iv. $y = (2x - 4)e^{x}$

3. **(C6.4 - N)** **(CI)** Determine the antiderivatives of the following functions: **(Cirrito 22.1, p723)**

   a. $\frac{dy}{dx} = \sin(2x - 4)$ b. $\frac{dy}{dx} = \frac{1}{2x-4}$ c. $\frac{dy}{dx} = \cos(2x - 4)$ d. $\frac{dy}{dx} = e^{2x-4}$

4. **(T3.4 - R; F2.1 - R)** **(CI)** You are given the function $g(x) = \sin(x)$ and $h(x) = 2x - 4$, where x is measured in radians. **(Cirrito 10.3, p337)**

   a. Determine the equation of the composite function, $y = goh(x)$.
   b. Given the composite function $y = goh(x)$, state which transformations have been applied to $g(x)$.
   c. Determine the period and amplitude of the function defined by $y = goh(x)$.
   d. Determine the x-coordinates of the maximum and minimum points in the first cycle of the composite function, $y = goh(x)$.
   e. Sketch two cycles of the composite function $y = goh(x)$.

5. **(C6.2; C6.4; A1.3 - R)** **(CA)** Given the function $b(x) = (2x - 4)^6$, **(Cirrito 4.1, p95)**

   a. Find the first three derivatives of $b(x)$.
   b. Find the antiderivative of $b(x)$.
   c. Expand $(2x - 4)^6$ and then determine the first derivative from this binomial expansion.

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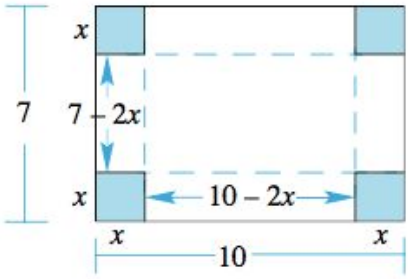
6. **(C6.4 - E)** (**CI**) Let the function $g(x) = 2x - 4$ represent a derivative, so in other words, we have $\frac{dy}{dx} = 2x - 4$. **(Cirrito 22.1, p723)**

   a. Find the equation of the most general antiderivative of $g(x)$.
   b. Now find the specific equation of the antiderivative of $g(x)$ that goes through the point $A(0,5)$
   c. Now find the specific equation of the antiderivative of $g(x)$ that goes through the point $B(-1,8)$
   d. Now find the specific equation of the antiderivative of $g(x)$ that goes through the point $C(2,-2)$
   e. Prepare a graph of the specific antiderivatives from Qb,c,d. What do you notice?

7. **(C6.3 - N)** (**CA**) A rectangular sheet of cardboard measures 10 cm by 7 cm. Small squares of equal area are cut from each of the four corners of the sheet. The remaining sides are then folded to form an open box. Find the maximum volume that the box can have and the dimensions of this box. ***NOTE: You MUST use calculus methods to solve this problem***. (HINT: see diagrams) **(Cirrito 21.4, p702)**



8. **(C6.5 - N)** (**CI**) Let the function $f(x) = 2x - 4$ and let the function $g(x) = (2x - 4)^2$. **(Cirrito 22.5.8, p755)**

   a. Sketch the two functions on the same graph, and label three points on each of the functions.
   b. Solve the equation $f(x) = g(x)$.
   c. Let the x-coordinates of the two intersection points be called x_1 and x_2. So, in the domain interval $x_1 < x < x_2$, which function is the "upper" and which is the "lower"?
   d. (**CA**) Find the area between the two functions.