

Math SL PROBLEM SET 57

Section A (Short Answer)

- (SP5.8 - R) (CA)** Apartments in my building are equipped with alarm systems to protect the apartments. The alarm system company says that their alarms are 96% reliable (that is, the alarm will trigger an alarm in 96% of all cases.) In my building, 10 apartments are equipped with these alarm systems. **(Cirrito 16.3.4, p544)**
 - Find the probability that all the alarm systems work properly.
 - Find the probability that at least half of the alarm systems work properly.
 - Find the probability that at most 8 of the alarm systems work properly.
- (C6.2 - R) (CI)** Find the equation of the derivative function for: **(Cirrito 19.3.6, p623)**
 - $f(x) = \sin(4x^3)$
 - $f(x) = 4\sin^3(x)$
 - $g(x) = \cos(e^{2x})$
 - $g(x) = e^{2\cos(x)}$
- (C6.2 - R) (CI)** For the following functions, comment upon the “pattern” in each function and then predict the equation of their derivative functions: **(Cirrito 19.3.4, p620)**
 - $f(x) = 4x^3\sin(x)$
 - $g(x) = e^{2x}\cos(x)$
 - $h(x) = x^3\ln(x)$
- (C6.2 - N) (CA)** For the following functions, **(Cirrito 19.3.4, p620)**
 - Use **Symbolab** to determine the derivatives of the following functions:
 - $f(x) = 4x^3\sin(x)$
 - $g(x) = e^{2x}\cos(x)$
 - $h(x) = x^3\ln(x)$
 - Explain and/or generalize the rule for these derivatives.
- (A1.2 - R) (CI)** Write each expression as the logarithm of a single quantity: **(Cirrito 7.4, p221)**
 - $\log(6) + \log(x)$
 - $\ln(y) - \ln(4)$
 - $\log_3 M + \log_3 N - 2\log_3 P$
 - $\log_b 12 - \frac{1}{2} \log_b 9$

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6. **(A1.2 - R) (CI)** Use the properties of logarithms to write each logarithmic expression as a sum, difference and/or multiple of simple logarithms: **(Cirrito 7.4, p221)**
- $\log_2(8x)$
 - $\ln\left(\frac{3}{y}\right)$
 - $\log(\sqrt[3]{7})$
 - $\log_b\left(\frac{x^3}{y^2}\right)$

Section B (Extended Response/Investigation)

7. **(CA6.3 - R) (CI)** Find the exact coordinates of any stationary points and any inflection points for the curve $f(x) = x^3 - 2x^2 + x$. Classify any stationary points as maximum(s), minimum(s) or neither. **(Cirrito 19.2.1, p609)**
8. **(CA6.3 - R) (CI)** Find the exact coordinates of any stationary points and any inflection points for the curve $y = xe^x$. Classify any stationary points as maximum(s), minimum(s) or neither. **(Cirrito 19.2.1, p609)**