

1. Let $f(x) = (3x+2)/(2-5x)$. Compute the derivative of the composite function $f \circ f$ when $x = 0$. That is to say, compute

$$(f \circ f)'(0).$$

[6]

2. What values must a, b and c have in order for the curve $y = ax^2 + bx + c$ to pass through the point $(1, 2)$ and be tangent to the line $y = x$ at the origin?

[8]

3. The velocity of a heavy meteorite entering the earth's atmosphere is inversely proportional to \sqrt{s} when it is s kilometers from the earth's center. Show that the meteorite's acceleration is inversely proportional to s^2 . [6]

Do only ONE of the following problems.

4. The half-life of polonium-210 is 139 days, but your sample will not be useful to you after 95% of the radioactive nuclei present on the day the sample arrives has disintegrated. For about how many days after the sample arrives will you be able to use the plutonium? [7]
5. Let $x = g(y)$ be the function inverse to $y = f(x) = (e^x - e^{-x})/2$.
 - (a) Compute a formula for $g(y)$. [6]
 - (b) Show g is an odd function. [4]