Digest 4.5

(A compilation of emailed homework questions, answered around Tuesday.)

Question. (From a student): I have no idea how to go about solving Chapter 3, Section 3.3, Question 008.

Sample question: Find the derivative of the function: $y = \sqrt{s^8 + 7}$.

Answer. This looks to me like a composition of two functions, i.e. the square root function composed with a polynomial. So, it seems like you should use the chain rule. To use the chain rule, we write $\sqrt{s^8 + 7} = f(g(s))$, and the chain rule then says that $\frac{d}{ds} f(g(s)) = f'(g(s))g'(s)$. As I suggested, maybe let's use $f(s) = \sqrt{s}$. Then what g should you use?

Question. (From a student): How do we compute $(d/dx)5^x$ or $(d/dx)5^{x+3}$?

Answer. The first example should be covered by the rule we derived in class with $b = 5$:

$$\frac{d}{dx} b^x = b^x (\ln b).$$

In the second case, we could use the Chain Rule with $f(x) = 5^x$ and $g(x) = x + 3$ and then differentiate $f(g(x)) = 5^{x+3}$. Alternatively, note that $5^{x+3} = 5^3 5^x$, so $(d/dx)5^{x+3} = 5^3 (d/dx)5^x$.