

Chem 163C Problem Set #1

due Thursday, 4/10 at the beginning of class

1) $\frac{d}{dx} e^{-ax^2}$

2) $\frac{d}{da} e^{-ax^2}$

3) $\frac{d}{dx} \frac{1}{1 - e^{ax}}$

4) $\frac{d}{dx} \frac{e^{ax}}{1 - e^{ax}}$

5) $\frac{d}{dx} \ln(1 - e^{ax})$

6) $\frac{d}{dx} x^2 e^{-ax}$ For $x \geq 0$, find the max of the function in problem 6.

7) $\frac{d}{da} \sum_{i=1}^{\infty} e^{-ae^i}$

8) $\frac{d}{da} \ln(1 + e^{ax})^N$

9) $\lim_{x \rightarrow 0} \frac{x}{1 - e^{ax}}$

10) $\int \frac{dx}{x^2 + x - 2}$

11) $\int x e^{-x} dx$

12) $\int_0^x \frac{dx}{(a - 2x)^3}$

- 13) Say you've got five very lopsided quarters each with $p_h = 0.8$. Given that you are tossing all of the coins at the same time, determine $p(n)$ for each possible outcome. Plot your results as $p(n)$ vs n . Next, determine the mean $\langle n \rangle$ and the standard deviation σ and locate these values on your plot (i.e., for σ find $\langle n \rangle + \sigma$ and $\langle n \rangle - \sigma$). Note: configurations are easily calculated in WolframAlpha using $C(N,n)$. (go to <http://www.wolframalpha.com>)