Show **all** of your work on this assignment and answer each question fully in the given context.

Please staple your assignment!

1. **Chapter 5, Section 2, Exercise 2 (page 263)**
   Solution
2. **Chapter 5, Section 2, Exercise 3 (page 263)**
3. **Chapter 5, Section 2, Exercise 4 (page 263)**
4. Suppose that the cumulative probability function (cdf) of the the magnitude, X, of a dynamic load on a bridge (in newtons) is given by

$$F(x) = \begin{cases} 0 & x < 0 \\ \frac{x}{8} + \frac{3}{16}x^2 & 0 \leq x \leq 2 \\ 1 & 2 < x \end{cases}$$

   (a) What is the probability that the load exceeds 1 newton?
   (b) What is the probability that the load is at most .5 newtons?
   (c) What is the probability that the load is between 1 and 1.5 newtons.
   (d) Sketch the cdf.
   (e) Derive the pdf.
   (f) Sketch the pdf.

5. (*This problem is worth 5 bonus points*) We know that the probability density function of a normal random variable with $\mathbb{E}(X) = \mu$ and variance σ^2 can be written as

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2}, -\infty < x < \infty$$

   and we also know that, as with any random variable,

$$\int_{-\infty}^{\infty} f(x)dx = \int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2} dx = 1$$

   Using the last fact, to find the value of $\int_{-\infty}^{\infty} e^{3x-x^2} dx$