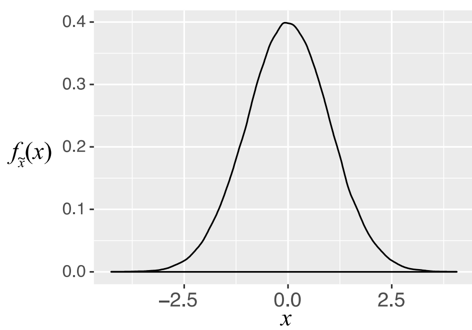
EMSE 6035 - Marketing of Technology
Concept Self-Assessment

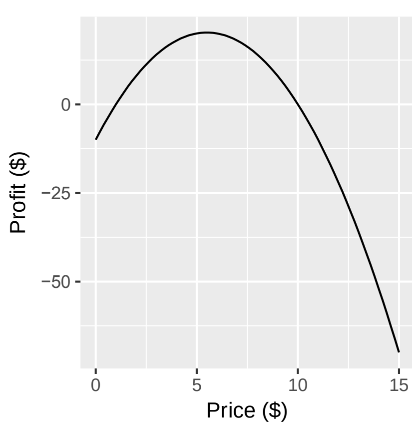
The following questions are designed to help students assess their background in core concepts that are required for EMSE 6035: Marketing of Technology. The course assumes students will have had prior exposure to probability theory, multivariable calculus, linear algebra, and basic linear regression. Refreshing these concepts prior to the start of the semester is encouraged, even for those who find these self-assessment questions easy to answer.

You are encouraged to first try to answer each question without using any references, and only revert to using Google or other references if absolutely necessary. If you find these questions difficult to answer (especially after searching for outside references), this course may be challenging. You may want to take other courses first or search for refresher courses / materials prior to taking EMSE 6035.

1. A random variable, $\tilde{x}$, has the probability density function (PDF), $f_{\tilde{x}}(x)$, shown below.
   - What is the approximate probability that $\tilde{x} = 0$?
   - What is the approximate probability that $\tilde{x} < 0$?



2. The chart below shows a profit function, $\pi = f(p)$, where p is price.
   - At approximately what price is profit maximized?
   - What is the value of $\frac{df}{dp}(p)$ at that price?
   - Is $\frac{d^2f}{dp^2}(p)$ positive or negative at that price?



3. A student estimates the following linear regression using the *mtcars* dataset in *R*:

$$f = \beta_0 + \beta_1 w$$

where *f* is the vehicle fuel economy (in miles per gallon), and *w* is the vehicle weight (in 1,000 lbs). The regression produces the following results:

	Estimate	Standard Error	t value	Pr(>|t|)
β_0	37.285	1.8776	19.858	8.24E-19
β_1	-5.344	0.5591	-9.559	1.29E-10

- How would you interpret the meaning of the coefficients β_0 and β_1?
- Use the results of this regression to predict the fuel economy of a car that weighs 4500 pounds.