MATH 152

Today

1. Questions/WeBWorK
2. 5.1 Area and Distance

Goals:

1. 5.1 Area and Distance (Understand the relationship between two seemingly unrelated questions; understanding the approach to finding areas of figures with curvy sides)
2. Understand a fundamental concept of calculus: we approximate curvy things with straight things (non-linear with linear).

Where is today's material used?

1. Physics: distance traveled by a particle (among many others)
2. Chemistry: fraction of gas molecules that can participate in a reaction (among many others)
3. Economics: finding total cost given marginal cost (among many others)
4. Any discipline that includes a notion of accumulated change.

5.1: Area and Distance

1. $A = bh$ and $d = rt$ have the same form, which connects (rectangle) areas to net change.
2. We can approximate curving functions with flat functions.
3. Our standard notations:
   (a) Interval $[a, b]$ with $a < b$ is subdivided into n subintervals of equal width $\Delta x = \dfrac{b-a}{n}$.

(b) Subdivision points are $a = x_0 < x_1 < x_2 < \cdots < x_{n-1} < x_n = b$.

(c) $m_i, M_i \in [x_{i-1}, x_i]$ such that $f(m_i)$ is a global min and $f(M_i)$ is a global max on $[x_{i-1}, x_i]$.

(d) x_i^* is a point of our choosing in $[x_{i-1}, x_i]$.

(e) $\displaystyle\sum_{i=m}^{n} f(i) = f(m) + f(m+1) + \ldots + f(n-1) + f(n)$.

4. **Theorem:** If R_n is the rectangle approximation we get for the area using n rectangles and f is continuous, then the area under the graph of f is $\lim_{n\to\infty} R_n$.

5. Examples: 5.1, p. 266: 13, 15

Next Time

1. 5.2 The Definite Integral

2. Turn in WeBWorK 5.1, Set03-AreasDistance: 1, 4