Worksheet 25

12 April 2016

1. **Warm up 1:** Using the word bank below, identify all parts of the given sum.

$$\sum_{i=5}^{25} \underbrace{\frac{2if(5i)}{7}} = \underbrace{\frac{10}{7}f(25)} + \cdots + \underbrace{\frac{50}{7}f(125)}$$
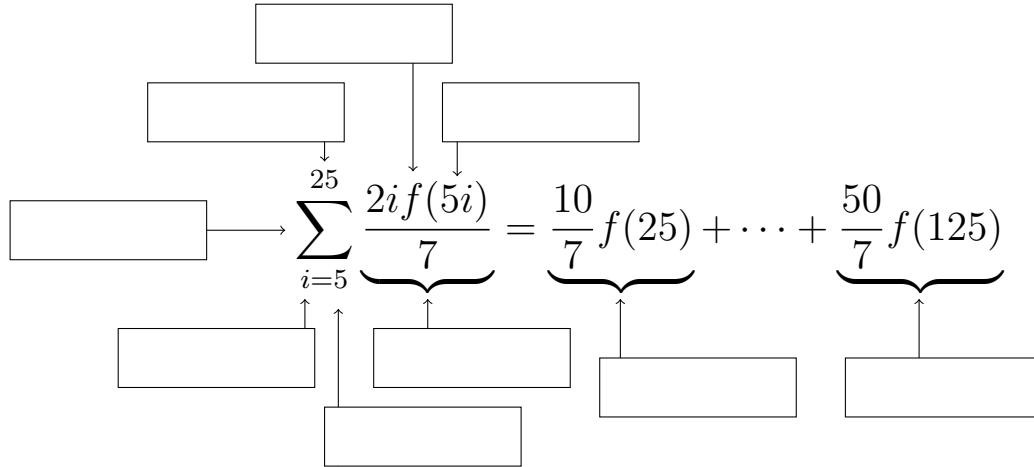
function   index   first index value   first term   sigma

argument   summand   last index value   last term

Warm up 2: What are the right and left Riemann sums of $f(x)$ over an interval $[a, b]$ with n subintervals?

2. For each of the following limits of Riemann sums, identify:
   i) the function under which the area is being calculated,
   ii) the interval over which the the area is being calculated,
   iii) the number of subintervals in the sum.

Sum	Function	Interval	Subintervals
$\sum_{i=1}^{50} \left(\frac{i}{50}\right)^2 \frac{1}{50}$			
$\sum_{i=12}^{77} \sqrt{1 - \left(-1 + \frac{2(i-11)}{66}\right)} \frac{1}{33}$			
$\sum_{i=1}^{n} \sin\left(\frac{-\pi}{2} + \frac{i\pi}{n}\right) \frac{\pi}{n}$			

3. Evaluate the following integrals using the fundamental theorem of calculus.

(a) $\int_0^1 x + 1 \; dx$

(c) $\int_0^1 (x+1)^3 \; dx$

(b) $\int_0^1 (x+1)^2 \; dx$

(d) $\int_0^1 (x+1)^4 \; dx$

(e) Let $f(n) = \int_0^1 (x+1)^n \; dx$. In terms of $f(n)$, can you guess what $f(n+1)$ will be?

4. Compute the derivative, with respect to t, of the following functions.

(a) $g(t) = \int_0^{t^2} e^{-x} \; dx$

(c) $\phi(t) = \int_a^{t^4} f(x) \; dx$

(b) $h(t) = \int_7^{t^3} \sec^2(x) \; dx$

(d) $\psi(t) = \int_a^{b(t)} f(x) \; dx$