Practice Exam 1
For First Skills Exam

1. Integrate:

   (a) $\int \sec^2(2x+1)dx$

   (b) $\int \frac{2x+1}{1+x^2}dx$

   (c) $\int \left(\frac{x^2}{\sqrt{2+x^3}} + sin(2x)\right) dx$

   (d) $\int_0^{\pi/8} \sin 4x dx$

   (e) $\int_0^1 \frac{1}{(2x+1)^2}dx$

   (f) $\int \frac{x}{\sqrt[4]{x+2}}dx$

   (g) $\int_0^1 \left(x^4+x\right)^5 \left(4x^3+1\right) dx$

   (h) $\int \frac{\left(1+\sqrt{x}\right)^9}{\sqrt{x}}dx$

   (i) $\int_{-1}^1 \frac{x \arcsin x^2}{1+x^4}dx$

   (j) $\int \cos x \cos(\sin x)dx$

   (k) $\int \left(\tan^2 x \sec^2 x\right) dx$

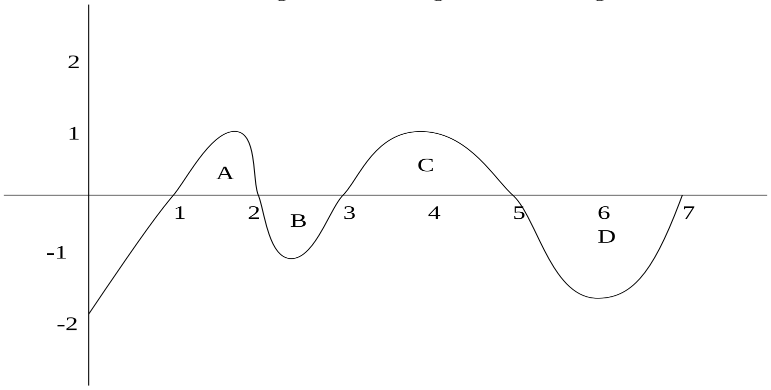
2. Let $I = \int_{-5}^5 f(x)dx$. Consider the following information about the function f.

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$f(x)$	2	1	3	2	5	4	3	1	3	3	4

   (a) Use the table to calculate R_{10}.

   (b) Use the table to calculate L_{10}.

3. Suppose that the graph of f is given in the figure below.



where $A = .7$ is the unsigned area of the first region, $B = .6$ is the unsigned area of the second region, $C = 1.3$ is the unsigned area of the third region, and $D = 2.2$ is the unsigned area of the last region.

(a) Calculate $\int_1^2 f(x)dx$.

(b) Calculate $\int_2^5 f(x)dx$.

(c) Calculate $\int_1^7 f(x)dx$.

4. A swimmer's distance from the starting platform is given by $d(t) = 50\sin t$. What is the swimmer's velocity at $t = 4$? What is the swimmer's speed at $t = 4$?

5. Let $f(x) = x^2$, and $I = \int_{-1}^2 f(x)dx$.

(a) Calculate M_6.

(b) Calculate T_6.

(c) Calculate R_6.

(d) Calculate L_6.

(e) What is the largest error given by Theorem 2 for R_6 and L_6?

6. Differentiate to show that $\int \sec x dx = \ln(|\sec x + \tan x|) + C$.

7. Sketch the region bounded by the graphs of $y = \tan x$, $x = 0$, and $y = 1$ and find its area.

8. Sketch the region bounded by the graphs of $x = 2$, $x = 5$, $y = -2x - 4$, and $y = x - 2$, and find its area exactly.

9. Find the smallest value of n for which Theorem 1 guarantees that R_n approximates $\int_0^2 e^{-x^2} dx$ within ± 0.00001.

10. Graph the function $f(x) = (x-2)^2 + 1$.