Review for Test 1

1. From Chapter 7 Check Your Understanding (p. 364-365): 3, 11, 15, 17, 18, 24, 27

2. From Chapter 7 Review (pp. 361-364): 5, 7, 11, 13, 15, 23, 25, 51, 65, 89, 101, 135, 139, 149, 157

3. Write

$$\frac{x^3+3x}{(x+2)(x-1)}$$

in the form

$$p(x)+\frac{A}{x+2}+\frac{B}{x-1}$$

where $p(x)$ is a polynomial and A and B are numbers.

4. Show that $\int \sin^n x\,dx = -\frac{1}{n}\sin^{n-1}x\cos x+\frac{n-1}{n}\int \sin^{n-2}x\,dx$ for any positive n [hint: write $\sin^n x$ as $\left(\sin^{n-1}x\right)(\sin x)$ and integrate by parts].

5. Compute $\int \sin(\ln y)\,dy$using integration by parts twice.

6. Suppose $f(1)=5$,$f(0)=-1$,$\int_0^1 f(t)\,dt=3$.Then compute:

   a. $\int_{-1}^0 f(x+1)\,dx$

   b. $\int_{1/2}^1 f(2x-1)\,dx$

   c. $\int_0^1 xf\left(x^2\right)dx$

   d. $\int_0^1 xf'(x)\,dx$

   e. $\int_0^1 \frac{f'(x)}{1+[f(x)]^2}dx$

7. Suppose $f(x)$ is an increasing, concave down function. Put LEFT(200), RIGHT(200), MID(200), TRAP(200), and SIMP(200) in order from smallest to largest.

8. Compute the exact value of $\int_0^1 \frac{4}{1+t^2}dt$ as well as LEFT(100), RIGHT(100), MID(100), TRAP(100), and SIMP(100). How many decimal places of accuracy does each achieve?

9. Suppose $f(x)$ is an increasing function and you know that LEFT(100)=0.123 and MID(100)=0.234. What can you say about the value of the integral (for instance, can you find an upper and/or lower bound)? Can you give an upper bound on the absolute value of the error?

10. Suppose $f(x)$ is a decreasing, concave up function and you know that LEFT(100)=0.234 and MID(100)=0.123. What can you say about the value of the integral (for instance, can you find an upper and/or lower bound)? Can you give an upper bound on the absolute value of the error?