Math 11B FALL 2007
MIDTERM 1 REVIEW PROBLEMS

1.

a. Express the Riemann sum as a definite integral from $[-\pi,3\pi]$.

$$\lim_{n\to\infty}\sum_{k=1}^{n}\frac{\sin(x_k)}{1+x_k}\Delta x$$

b. Express the following as a Riemann sum using the definition of the definite integral.

$$\int_{-3}^{5}\frac{x^2}{1+x^3}dx$$

2.

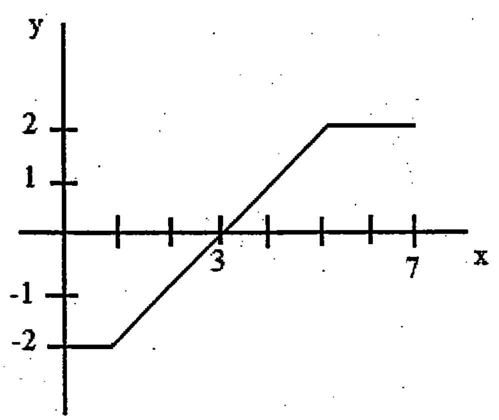
a. Approximate the area under $y=x^2+1$ from 0 to 3 using three equal subintervals and right endpoints.

b. Approximate the following definite integral using left endpoints and four equal subintervals.

$$\int_{1}^{5}\ln(x)dx$$

3.

a. Use a geometric argument to calculate $\int_0^7 f(x)dx$ given the graph of $y=f(x)$.



b. Find the average VALUE OF $f(x)$ ON $[0,7]$.

4. Suppose $f(x)=\ln(x)$ represents the path of a particle.
   a. Setup an integral describing the length of the path that the particle travels, L(t), ON $[0,t]$.
   b. Find the instantaneous rate of change, R(t), of L(t) (i.e. $\frac{dL(t)}{dt}$).

5. Find the antiderivatives of the following functions.

   a. $f(x)=\dfrac{x^2+1+x}{(x^2+1)x}$

   b. $g(x)=\dfrac{1}{2+32x^2}$

   c. $h(x)=\dfrac{1-x^2}{\sqrt{(1-x^2)^3}}+\csc(x)\cot(x)$

   d. $p(x)=(3e^x)e^{2x}+e^xe^{-x}+\frac{5}{2}(e^{-x})^5$

6. Find the length of $y^{1/3}=\sqrt{x^2+\frac{6}{9}}$ from $x=0$ to $x=1$

7. Find the area bounded by $y=\cos(x)$ and $y=\frac{2}{\pi}x+1$ IN THE 2^{ND} QUADRANT.

8. Evaluate the following definite integrals.

   a. $\displaystyle\int_{\frac{\sqrt{2}}{2}}^{\frac{\sqrt{3}}{2}}\frac{4}{\sqrt{1-x^2}}dx$

   b. $\displaystyle\int_{1}^{2}\frac{2}{3x+1}dx$

   c. $\displaystyle\int_{0}^{\pi}(\sin(x)+\cos(x))dx$

9. Let $\frac{dL}{dt}=\sqrt{2t+4}$
   a. Find $L(t)$ given $L(0)=98$.
   b. Find the net change from $[6,16]$.