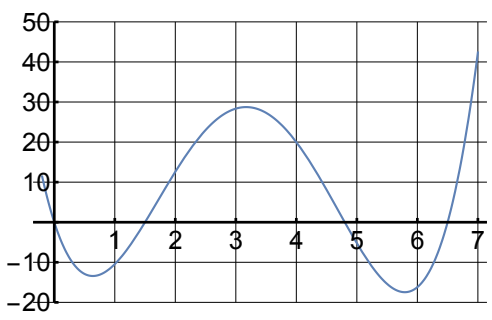
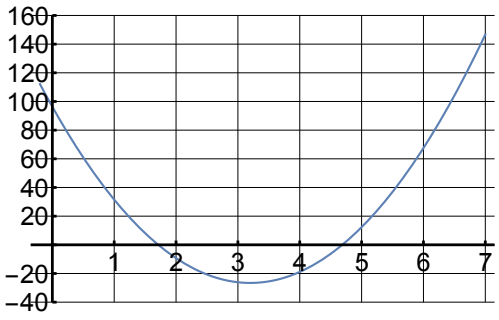
These are only a *few* sample problems to *help* you prepare for the exam. You should also be certain that you completely understand the WeBWorK assignments, Problems Sets, in-class work, and your class notes.

1. You will certainly want to review all of the antidifferentiation problems from the homework and in-class work.

2. The graphs of f'' and $f^{(4)}$ are shown below.



Plot of $y = f''(x)$



Plot of $y = f^{(4)}(x)$

   (a) Let $I = \int_2^6 f(t)\,dt$. Compute an upper bound on the error $|I - T_{42}|$.

   (b) Let $I = \int_2^5 f(t)\,dt$. Find the smallest value of n such that $|I - S_n| \leq 0.005$.

   (c) Let $I = \int_5^6 f(t)\,dt$. Will T_n overestimate or underestimate I? Explain.

3. Let R be the region bounded by the graphs $y = \sqrt{8x}$ and $y = x^2$. Find the volume of the solid formed when R is rotated about

   (a) The x-axis

   (b) The horizontal line $y = 5$

4. Set up the integral for each of the following. *You do not need to evaluate these integrals.*

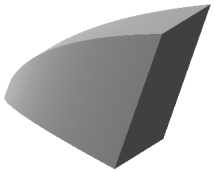
   (a) The volume of the solid formed with the region R from #3 is rotated about the line $x = 6$

   (b) The length of the curve $y = x\sin(x) + 8$ from $x = 0$ to $x = \pi$

   (c) The area of the surface formed when the curve from (b) is rotated about the x-axis

5. Show that the improper integral $\int_1^\infty e^{-x^3} x^5\,dx$ converges and find its exact value.

6. The base of a certain solid is the region in the xy-plane bounded to the left by the parabola $x = 9y^2$ and to the right by the line $x = 18$. The cross sections perpendicular to the x axis are squares. Find the volume of the solid.



7. Explain why the integral is improper and determine whether the integral converges or diverges. You do not need to find the values of the convergent integrals.

   (a) $\displaystyle\int_2^\infty \frac{x}{x^2-2}\,dx$

   (b) $\displaystyle\int_0^\infty \frac{1}{x^4+\sqrt[3]{x}}\,dx$

8. Let $I = \displaystyle\int_a^b f(x)\,dx$ be an improper integral where b may be a finite number or infinity.

   (a) Give values of a and b, and a function $f(x)$ where
   - The integrand $f(x)$ converges on the interval of integration
   - The integral I diverges

   (b) Give values of a and b, and a function $f(x)$ where
   - The integrand $f(x)$ diverges on the interval of integration
   - The integral I converges

   (c) Be sure to explain your answers

9. Let $I = \displaystyle\int_0^{2\pi} \sqrt{1+\cos(x)^2}\,dx$.

   (a) Interpret I as the area of a certain region R. What is R?

   (b) Interpret I as the length of a curve C. What is C?

   (c) Interpret I as the volume formed when the graph of a function $y = f(x)$ is rotated about the x-axis. What is $f(x)$?

   (d) Draw sketches to support your answers.