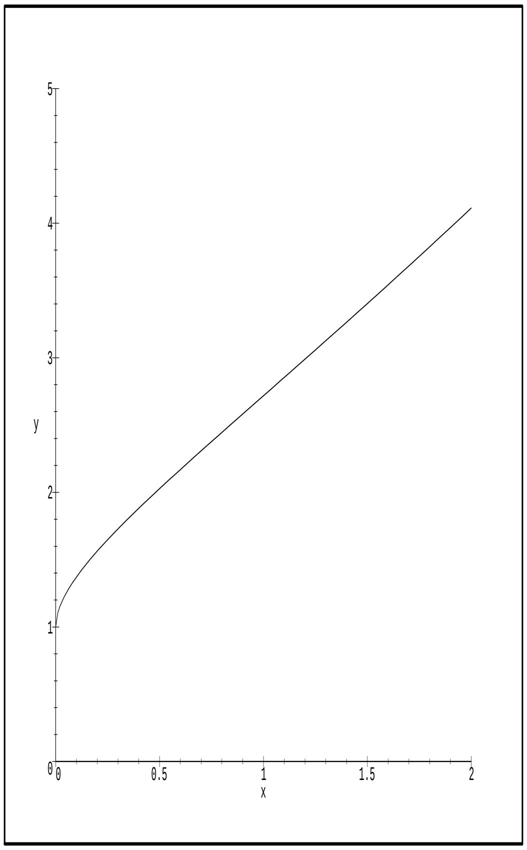
Practice Exam 3
For First Skills Exam

1. Let $I = \int_0^2 e^{\sqrt{x}}dx$. The graph of $e^{\sqrt{x}}$ is shown below.



(a) Calculate L_4, R_4, M_4, and T_4.

(b) Calculate the maximum error given by Theorem 1 for each of L_4, R_4,, and T_4, according to Theorem 1.

(c) What is the maximum possible error in L_4 and R_4, according to Theorem 2?

2. Integrate:

(a) $\displaystyle\int \frac{e^x + 1}{e^x}dx$

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

(c) $\displaystyle\int_0^3 x\sqrt{9 - x^2}dx$

(d) $\displaystyle\int \left(\frac{\cos\sqrt{x}}{\sqrt{x}} x\sin(x^2)\right) dx$

(e) $\displaystyle\int x^3\sqrt{2 + x^4}dx$

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

(g) $\displaystyle\int_2^3 \frac{3x^2-1}{(x^3-x)^2}dx$

(h) $\displaystyle\int \frac{3x-1}{(3x^2-2x+1)^4}dx$

(i) $\displaystyle\int_0^{13} \frac{1}{\sqrt[3]{(1+2x)^2}}dx$

(j) $\displaystyle\int \frac{e^x}{4e^{2x}+3}dx$

(k) $\displaystyle\int \frac{1}{\sqrt{1-9x^2}}dx$

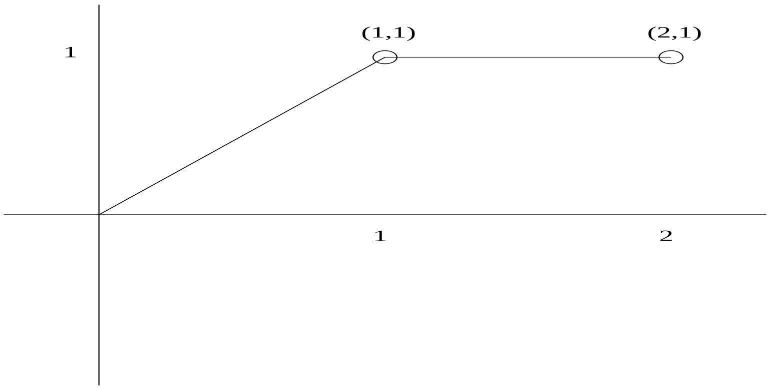
3. Sketch the region bounded by the given functions. Then find its area *exactly.*

   (a) $y = 2x, \; y = -2x, \; x = 4$

   (b) $y = x^2, \; y = 2x - 1, \; x = 0$

4. Verify by differentiation that $f(x) = \frac{1}{2}\sin^2 x$ and $g(x) = -\frac{1}{2}\cos(2x)$ are both antiderivatives of $\sin x \cos x$.

5. Find the average value of the function graphed below over the interval $[0, 2]$.



6. A rocket launched from earth is a distance of $d(t) = .1t^2 + t + 4000$ miles from the center of the earth t minutes after launch. Find the velocity of the rocket at $t = 10$ minutes.