MA 114 Worksheet #08: Review for Exam 01

1. Find the following antiderivatives

   (a) $\displaystyle\int x^2 \sin(2x)\,dx$

   (b) $\displaystyle\int xe^{2x}\,dx$

   (c) $\displaystyle\int \frac{dx}{x^2+2x+10}$

   (d) $\displaystyle\int \frac{x+3}{(x-6)(x-3)}\,dx$

   (e) $\displaystyle\int \frac{3x+6}{x^2-10x+24}\,dx$

   (f) $\displaystyle\int \frac{3x^2+9x+8}{x^2(x+2)^2}\,dx$

   (g) $\displaystyle\int \sin^5(x)\cos(x)\,dx$

   (h) $\displaystyle\int \sin^2(x)\,dx$

   (i) $\displaystyle\int \frac{dx}{x\sqrt{x^2+9}}$

   (j) $\displaystyle\int \sqrt{16+4x^2}\,dx$

   (k) $\displaystyle\int x^3\sqrt{9-x^2}\,dx$

   (l) $\displaystyle\int_1^2 \frac{dx}{x\ln x}$

   (m) $\displaystyle\int_1^\infty xe^{-2x}\,dx$

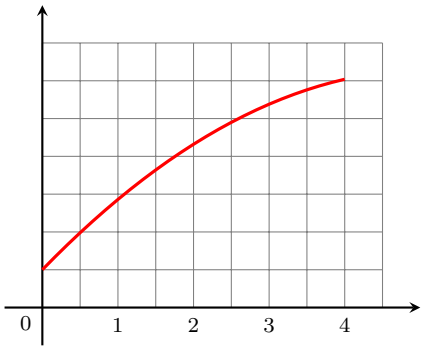
2. Let $f(x) = e^{-x^2}$. Find a value of N for use in the trapezoid rule to compute

$$\int_0^3 e^{-x^2}\,dx$$

   accurate to within 0.0001. Hint: $|f(x)| \le 1$ and $|f'(x)| \le 2$ on $[0,3]$.

3. Calculate M_6 and T_6 to approximate $\displaystyle\int_{-2}^1 e^{x^2}\,dx$.

4. Let $I = \int_0^4 f(x)\,dx$, where f is the function whose graph is shown below. For any value of n, list the numbers L_n, R_n, M_n, and T_n in increasing order.



5. An airplane's velocity is recorded at 5-minute intervals during a 1 hour period with the following results, in miles per hour:

$$\begin{array}{llllllll} 550, & 575, & 600, & 580, & 610, & 640, & 625, \\ 595, & 590, & 620, & 640, & 640, & 630 \end{array}$$

   (a) Use Simpson's Rule to estimate the distance traveled during the hour.

   (b) Use the trapezoid rule to estimate the distance traveled during the hour.

6. For which values of p does the improper integral

$$\int_0^\infty \frac{dx}{(1+x)^p}$$

converge? If it converges, to what value does it converge?