

**Answers for Final Review Problems**

2. (a)  $36\sqrt{2} + \frac{97}{2}$  (b)  $\frac{(\arctan x)^2}{2} + C$  (c)  $x \sin(x) + \cos(x) + C$  (d)  $\frac{2(e^x + 5)^{3/2}}{3} + C$
3. (a) A plane; (b) A parabolic cylinder along the y-axis.
4. (a) Use the formula  $a_n = \frac{f^{(n)}(0)}{n!}$  (b)  $(-\infty, \infty)$
5. (b)  $f_x(0, 2) = 2; f_y(0, 2) = 1$
6. (a) Compare this with the p-integral where  $p = 5$  (b)  $b \geq 4.73$  will work  
 (c) Since the integrand is decreasing and concave up,  $L_{10}$  and  $T_{10}$  overestimate,  $R_{10}$  and  $M_{10}$  underestimate.  
 (d)  $M_{10}$  (e) It converges by the integral test. (f)  $\frac{5}{4}$  (obtained by using the integral test on the series  $\sum_{k=1}^{\infty} \frac{1}{k^5}$ )
7. It converges by the alternating series test.
8. (b)  $y = \frac{1}{x+2}$
9. (b)  $\frac{64}{3}$  (c)  $\frac{640\pi}{3}$
10. (a)  $\frac{1}{8}$  (b) It converges to  $\frac{1}{8}$  (c) The series diverges by the nth term test.
11. (a)  $y = 131e^{.0233t}$  in millions where  $t = 0$  in 1950. (b) 77.7 years  
 (c) 126 million (Note: This is US population assuming the growth rate used in predicting the world population.)  
 (d) (In this problem, delete the phrase: "the same initial relative rate of growth and")  
 $y = \frac{20}{151.7e^{-.0236t} + 1}$  in billions,  $t=0$  in 1950.  
 (e) 1.457 billion (Under the exponential model it would be 1.512 billion).