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).