Answers to Dr. Z.'s Practice Final For Fall 2012 (Sections 1-3, 7-9)

Disclaimer: Not responsible for any errors. One dollar prize for the first discoverer of any error.

Version of Dec. 10, 2012, 11:30am (thanks to Eunhee Kim who won a dollar [correcting a typo in #14(a)]

1. (b) 72 ; (c) \( \pi \int_{-3}^{3} ((19 - x^2)^2 - (x^2 + 1)^2) \, dx \); (d) \( 2\pi \int_{-3}^{3} (4 - x)(18 - 2x^2) \, dx \).

2. (a) \( \ln|x - 2| + \frac{1}{2} \ln(x^2 + 9) + C \); (b) \( 4\pi \)

3. (a) \( \frac{16}{373} \); (b) \(-\frac{1}{729}(81x^2 + 18x + 2)e^{-9x} + C \)

4. \( y = \sqrt{2}\cos 3x - 1 \).

5. \( 7 + e^8 \)

6. (a) \( t = -1 \) and \( t = 1 \) ; (b) \( y = -\frac{5}{7}x \) and \( y = \frac{5}{7}x \), respectively.

7. (a) conv. abs. [by Limit Comparison Test and \( p \)-test with \( p = \frac{5}{8} \) ]; (b) conv. abs. [by Limit Comparison Test and \( p \)-test with \( p = 3 \) ] .

8. (a) diverges [by the divergence test] (b) conv. [sum of two geometrical series, with \( r = \frac{1}{5} \), and \( r = \frac{4}{5} \), both converge by the geometric series test (or ratio test, or root test) ]

9. 9 terms.

10. (a) converges to 23 (b) converges to \( \frac{4}{7} \) (c) diverges .

11. (a) \( \frac{1}{7} \) (b) \(-\frac{1}{2} \leq x < \frac{1}{2} \)

12. conv. [(i) show that \( e^{-x^4} < e^{-x} \) for \( x > 1 \) (ii) show that \( \int_{1}^{\infty} e^{-x} \, dx \) is a finite number ]

13. (a) \( 1 - \frac{1}{12} + \frac{1}{797} + \ldots + \frac{(-1)^n}{n^{5/3}(3n+1)} + \ldots \)
(b) \( \frac{11}{12} \) (c) \( \frac{1}{120} \)

14. (a) \( \frac{73}{47} \) (b) \( \frac{24}{47} \)

15. (a) \( T_2(x) = 1 + 10(x - 1) + 45(x - 1)^2 \) (b) \( 1.1045 \) (c) \( 120 \cdot (1.01)^7 \cdot (0.01)^3 \)

16. \( 1 + x - \frac{1}{3}x^3 \)