EVEN ANSWERS for MTH 32

LESSON 1 (5.4) Riemann Sums

p. 306 4. $\int_0^3 (x^3 - 3x^2 + 1)dx$ 6. $\int_0^5 \sqrt{25 - x^2}\, dx$

20. $(2 + \sqrt{3})/6$ 46. –20

LESSON 2 (5.5) Evaluation of Integrals

p. 316 36. 1/2 38. 1/3 40. 1/4 42. $2/\pi$

54. Use Comparison property (2), p. 315.

LESSON 3 (5.6) Fundamental Theorem of Calculus

p. 325 16. 58/7 20. 5/2 24. $(7 - 4\sqrt{2})/3$ 56. | *cos* x | *cos* x

LESSON 4 (5.7) Substitution

p. 333 16. 1/5(3 – 5x) + C 36. $-2/(1 + \sqrt{x}) + C$ 54. –1

LESSON 5 (5.9) Numerical Integration

p. 357 2. $T_5 = 2.34$; exact value = 7/3 6. $T_4 = 1.90$; exact value = 2

24a. ≈ 14.33° C. 26. Show $\int_1^{2.7} (1/x)dx < 1 < \int_1^{2.8} (1/x)dx$.

$\int_1^{2.7} (1/x)dx < T_{10} < .9954$ and $1.0250 < M_5 < \int_1^{2.8} (1/x)dx$

LESSON 6 (6.1) Setting Up Integrals

p. 374 2. 1/2 8. 26/3 14. $\int_{-2}^{3} 2\pi\, x\sqrt{1 + [f(x)]^2}\, dx$ 18. $200/\pi$

LESSON 7 (6.2) Volume

p. 384 2. 8π 16. $16\pi/3$ 22. $640\pi/3$ 36. $4\pi ab^2/3$

38. $V_b = \pi(1 - 1/b^3)/3$; $V = \lim_{b\to\infty} V_b = \pi/3$ 42. 9/70

LESSON 8 (6.4) Arcs and Surfaces

p. 404 6. $\int_0^1 \sqrt{4y^2 - 16y + 17}\, dy$ 12. $\int_0^4 2\pi\, x\sqrt{1+4x^2}\, dx$

14. $\int_0^1 2\pi\,(4 - x^2)\sqrt{1+4x^2}\, dx$ 24. 33/16

30. $\pi(145\sqrt{145} - 10\sqrt{10})/27 \approx 199.48$ 32. $67\pi/10$

40. $4\pi r^2$ 42. $12\pi/5$

LESSON 9 (6.6) Force and Work

p. 413 2. 32 10. $78{,}000\pi \approx 245{,}044.23$ ft-lbs

12. $39{,}000\pi \approx 122{,}522.11$ ft-lbs 16a. $40{,}500\pi \approx 127{,}234.5$ ft-lbs

18. $2{,}125{,}000\pi \approx 6{,}675{,}884.4$ ft-lbs 20. 1250 ft-lbs

26. $21{,}600\pi \approx 67{,}858.4$ ft-lbs 28. 1087.5 ft-lbs 30. $W = \rho(4/3)\pi R^3 H$

LESSON 10 Review

p. 362 44. –9/2 46. 1/11

p. 424 10. 22/105 24. (a) $23\pi/9$ (b) $256\pi/15$ 32. 29,687.5 ft-lbs.

34. $25\pi/8$ ft-lbs.

LESSON 11 (7.1, 4) Inverse Functions and ln x

p. 439 26. 2 *cot* x 30. $1/(x\ ln\ x)$ 40. $1/(x^2 - 1)$

p. 486 40. $(2/3)\ln(1 + x^{3/2}) + C$ 46. $-1/\ln x + C$ 48. $(2/3)(1 + \ln x)^{3/2} + C$

LESSON 12 (7.1, 4) Exponential Functions

p. 439 14. $e^{-1/x}/x^2$ 20. $(e^{-x}-e^{x})\sin(e^{x}+e^{-x})$ 62. $y-e^{-2}=e^{-3}(e-x)$

p. 485 6. 1/t + 2t 14. $1/(e^{y}+ye^{y})$ 42. $\ln(e^{x}+e^{-x})+C$

44. $(1/2)e^{-1/x^2}+C$

p. 440 48. $x^{x}(1+\ln x)$ 50. $\dfrac{(1+x)^{1/x}(x-(1+x)\ln(1+x))}{x^2(1+x)}$

p. 465 2. $(-2)(2^{1/x^2})(\ln 2)/x^3$ 22. $\pi^{x}\ln\pi+\pi x^{\pi-1}$ 26. $-10^{-x^2}/2\ln 10+C$

40. $\lim_{x\to 0+} f(x)=0$ and $\lim_{x\to 0-} f(x)=1$

LESSON 13 (9.1) Growth and Decay

p. 556 22. 51,840 24. ≈ 14,734 yrs. 26. $14,723.40

28. ≈ 2584.57 mg. 36. ≈ 119,887 yrs. 38. ≈ 723 yrs.

LESSON 14 (9.3) Separable Differential Equations

p. 574 32. ≈ 67 min. 38. ≈ 10:29 am

40. (a) $x(t)=10{,}000(10-8\times 2^{-t/15})$ (b) March 31 (c) $\lim_{x\to\infty} x(t)=100{,}000$

p. 619 32. ≈ 63 min.

LESSON 15 (7.2,3) l'Hopital's Rule

p. 448 4. 3 6. 1/2 14. ∞ 44. $1/(2\sqrt{3})$

p. 453 14. 1/2 22. e^{-1} 26. $e^{2/3}$

LESSON 16 (7.5) Inverse Trigonometric Functions

p. 475 4. (a) 0 (b) π (c) π/3 (d) 3π/4

6. $e^{x}/(1+e^{2x})$ 8. $1/[(1+x^2)\tan^{-1}x]$ 32. π/6

34. −π/6 42. $(1/15)\tan^{-1}(x^3/5)+C$

44. $(2/3)\tan^{-1}(x^{3/2})+C$ 50. $(1/2)(\tan^{-1}x)^2+C$ 52. $(1/4)\ln 2$

LESSON 17 (7.6) Hyperbolic Functions

p. 483 12. $4\ sinh^3 x\ cosh\ x$ 16. $(1/2)(u + (1/6)sinh\ 6u) + C$

28. $ln|e^x - e^{-x}| + C$ or $ln|\ sinh\ x\ | + C$ 46. $(1/2)\ cosh^{-1}(x^2) + C$

54. $(\pi/8)(e^{2\pi} - e^{-2\pi}) - (\pi^2/2) \approx 205.35$ 56. (a) 1 (b) 1 (c) 1/2

LESSON 18 Review

p. 454 30. 0

p. 486 22. $(\ln x)^{\ln x}\left(\frac{1+\ln\ln x}{x}\right)$ 28. 0 32. – 2 36. 1

50. $(3/2)ln\ (1 + x^{2/3}) + C$ 54. $(2e^2 - 1)/4.$ 58. $e^t / (1+e^{2t})$

82. $(1/6)\ tan^{-1}\ (2x/3) + C$ 92. $(1/2)cosh^{-1}(2x) + C$

LESSON 19 (8.3) Integration by Parts

p. 499 4. $-t^2\ cos\ t + 2t\ sin\ t + 2\ cos\ t + C$ 6. $(1/2)x^2 \ln x - (1/4)x^2 + C$

8. $(1/6)[sin\ 3z + cos\ 3z]e^{3z} + C$ 10. $-(1/x)[ln\ x + 1] + C$

20. $(t/2)[sin(\ln t) - cos(ln\ t)] + C$ 22. $x\ ln(1 + x^2) - 2x + 2\ tan^{-1}\ x + C$

24. $(1/2)(x^2 - 1)\ tan^{-1}\ x^{1/2} - (1/6)x^{3/2} + (1/2)x^{½} + C$

48. $-(1/8)(sin\ 3x)(sin\ x) - (3/8)(cos\ 3x)(cos\ x) + C$

LESSON 20 (8.4) Trigonometric Integrals

p. 507 1. $(1/2)[x - (1/4)\ sin\ 4x] + C$ 4. $2\ tan\ (x/2) - x + C$

5. $(-1/3)\ ln\ |\ cos\ 3x\ | + C$ or $(1/3)\ ln\ |\ sec\ 3x\ | + C$

8. $(-1/2)\ ln\ |csc\ 2x + cot\ 2x| + C = (1/2)\ ln\ |csc\ 2x - cot\ 2x| + C$

12. $(3/8)x - (1/4)sin\ 2x + (1/32)sin\ 4x + C$

25. $(-1/4)\,csc^2\,2x - (1/2)\,ln\,|\,sin\,2x\,| + C$

28. $(-1/4)cot^4\,x + C$

30. $tan\,t - cot\,t + C$

34. $(1/2)tan\,2x + (1/6)tan^3\,2x + C$

38. $(1/3)tan^3\,x - tan\,x + x + C$

44. $-csc\,x - cot\,x + C$

56. $L = \int_0^{\pi/4} \sec x\,dx = \ln(1+\sqrt{2})$

LESSON 21 (8.5) Partial Fractions

p. 514 5. $(1/5)(ln\,|\,x-2\,| - ln\,|\,x+3\,|\,) + C$

6. $x^2/2 - x + (27/5)ln\,|x+3| + (8/5)ln\,|x-2| + C$

10. $(1/3)tan^{-1}x - (1/6)tan^{-1}(x/2) + C$

32. $(1/4)[\ln|x-1| - ln\,|x+1|] + (1/2)tan^{-1}x + C$

38. $(1/5)[ln\,|sin\,\theta - 3| - ln\,|\,sin\,\theta + 2|\,] + C$

p. 595 16. $ln\,[(2N)/(15000-N)] = (3/20)t;\ t = (20/3)ln\,4 \approx 9.24$ days

LESSON 22 (8.6) Trigonometric Substitution

p. 519 4. $(\sqrt{x^2-25})/(25x) + C$

38. $(1/2)(x\sqrt{1+x^2} + \sinh^{-1}x) + C$

54. $\int_2^5 \sqrt{\frac{x}{x-1}}\,dx = \sqrt{x}\,\sqrt{x-1} + \ln\left|\sqrt{x}+\sqrt{x-1}\right| \Big|_2^5 \approx 3.620$

LESSON 23 (8.7) Integrals with Quadratics

p. 524 4. $-(1/2)[(x+3)/(x^2+4x+5) + tan^{-1}(x+2)] + C$

6. $2\,sin^{-1}((x+1)/2) - \sqrt{3-2x-x^2} + C$

21. $(7x-12)/(9\sqrt{6x-x^2}\,) + C$

46. $(1/12)[ln\,|\,x+2\,| + \sqrt{3}\ tan^{-1}((x-1)/\sqrt{3}) - (1/2)ln\,(x^2-2x+4)] + C$

LESSON 24 (8.8) Improper Integrals

p. 537 16. 0 18. 1/e 28. diverges 30. diverges

32. 1 44. For k > 1, $\int_1^\infty \frac{dx}{x^k} = \frac{1}{k-1}$ 50. π

LESSON 25 (11.1, 2) Infinite Sequences

p. 689 2. $a_n = 5n - 3$ 4. $a_n = (-1)^{n+1}/2^{n-1}$ 6. $a_n = 1/(n^2 + 1)$

8. $a_n = (5/2)[3 + (-1)^{n+1}]$ 12. diverges 16. 0

18. 0 24. diverges 28. 1

LESSON 26 (11.3) Infinite Series

p. 699 2. converges with sum e/(e-1) 4. diverges (n^{th} term test)

10. diverges (n^{th} term test) 14. converges with sum 2

16. diverges 18. diverges (n^{th} term test)

20. diverges (n^{th} term test)

50. $S_n = 1/2 - 1/(4n+2)$; $\lim_{n\to\infty} S_n = 1/2$; series converges with sum 1/2.

52. $S_n = ln(n + 1)$; $\lim_{n\to\infty} S_n = \infty$ and the series diverges

70. Peter (36/91); Paul (30/91); Mary (25/91)

LESSON 27 Review

p. 540 2. $ln\,|1+ tan\, t\,| + C$ 6. $-cot\, x - (cot^3 x)/3 + C$

16. $x^3/3 - x + 2\, tan^{-1} x + C$ 28. $2\, ln\,|x| - 3\, ln\,|x+1| + ln\,|x-1| + C$

34. $ln\,|csc\, x - cot\, x| + C$ 38. $ln[(\sqrt{x^2+1} - 1)/x] + C$

60. $2[sin\,\sqrt{x} - \sqrt{x}\, cos\,\sqrt{x}\,] + C$

72. $(1/8)[cos\, x\, cos\, 3x + 3 sin\, x\, sin\, 3x] + C$

82. $e^x\, sin^{-1}(e^x) + \sqrt{1-e^{2x}} + C$

124. $(2/9)(x-1)^{9/2} + (4/7)(x-1)^{7/2} + (2/5)(x-1)^{5/2} + C$

p. 767 2. 8/7 4. 0 8. 1 10. 0 14. e^4

24. diverges 28. diverges 44. 271801/99990

LESSON 28 (11.4) Taylor Series

p. 713 2. $sin\, x = x/1! - x^3/3! + (cos\, z)x^5/5!$ (z between 0 and x)

6. $ln\,(1+x) = x - x^2/2 + x^3/3 - x^4/4 + x^5/(5(1+z)^5)$ (z between 0 and x)

10. $f(x) = -7 + 5x - 3x^2 + x^3$

14. $\sqrt{x} = 10 + (x-100)/(1!20) - (x-100)^2/(2!4000) + 3(x-100)^3/(3!800000)$

$- 15(x-100)^4/(4!16z^{7/2})$ (z between 100 and x)

24. $1 + x^3 + x^6/2! + x^9/3! + x^{12}/4! + \ldots$

28. $sin^2 x = \sum_{n=0}^{\infty} \frac{(-1)^n (2x)^{2n+2}}{2(2n+2)!} = \sum_{n=1}^{\infty} \frac{(-1)^{n-1}(2x)^{2n}}{2(2n)!}$ 30. $\sum_{n=0}^{\infty} x^n$

36. $\sum_{n=0}^{\infty} (n+1)x^n$

LESSON 29 (11.5) Integral Test

p. 720 4. converges 24. converges 28. converges 30. diverges

LESSON 30 (11.6) Comparison Tests

p. 727 2. diverges 4. converges 6. converges 10. diverges

12. converges 16. converges 22. diverges 28. converges

34. converges

LESSON 31 (11.7) Alternating Series

p. 735 4. converges 8. converges 18. diverges

52. $\sum_{n=0}^{4} \frac{(-1)^n}{(2n)!} \approx .54030$ (5 terms) 54. $\sum_{n=1}^{6} \frac{(-1)^{n+1}}{n10^n} \approx .0953102$ (6 terms)

LESSON 32 (11.7) Ratio and Root Tests

p. 735 20. converges 28. converges absolutely 32. diverges

36. converges absolutely 42. converges absolutely

LESSON 33 (11.8) Power Series

p. 748 4. $-5 < x \le 5$ 6. $-\infty < x < \infty$ 14. $(-1/4) < x \le (1/4)$

16. $0 \le x \le 1$ 32. $\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{10^{n+1}}$; R = 10

38. $1 + (3/2)x^2 + (3/2)(1/2)x^4/2! + (3/2)(1/2)(-1/2)x^6/3!$

$+ (3/2)(1/2)(-1/2)(-3/2)x^8/4! + \ldots$; R = 1

44. $x - x^3/3!3 + x^5/5!5 - x^7/7!7 + \ldots = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!(2n+1)}$

50. $2x^2/(1-x)^3$ 52. 2; 3/2

LESSON 34 (11.9) Power Series Computations

p. 756 1. 2 terms; 4.021 3. 2 terms; .479 4. 4 terms; .819

6. 2 terms; .095 13. 4 terms; .4872 16. 3 terms; .4970

20. 3 terms; .4864 21. 4 terms; .5133 24. 1/6 28. 2

31. 4 terms; .681998 34. 10 places 36. 3 places

LESSON 35(11.10) Series Solutions of Differential Equations

p. 766

LESSON 36 Review

p. 767 16. diverges 18. converges 20. converges 30. converges

32. (–2/3,2/3) 38. [–1,1) 40. (0,2)

60. $a_0 = 0$, $a_1 = 1$, $a_2 = 0$, $a_3 = 1/3$