

This review sheet is intended as a supplement to the text, your notes, and your graded papers. The lack of a particular type of problem on this review sheet does *not* mean that type of problem won't appear on the test.

**Integrate the function.**

1.  $\int \frac{3}{\sqrt{3+x^2}} dx$

2.  $\int \frac{dt}{t^2 \sqrt{3-t^2}}$

3.  $\int \frac{(9-t^2)^{3/2}}{t^6} dt$

4.  $\int \frac{40 dx}{x^2 \sqrt{x^2+64}}$

5.  $\int \frac{\sqrt{x^2+36}}{4x^2} dx$

6.  $\int \frac{\sqrt{x^2-49}}{x} dx$

7.  $\int \frac{dx}{x \sqrt{64x^2-16}}$

8.  $\int \frac{2x+13}{x^2+9x+20} dx$

9.  $\int \frac{96}{t^3+2t^2-8t} dt$

10.  $\int \frac{5x^2+x+16}{x^3+4x} dx$

11.  $\int \frac{x^3}{x^2+16x+64} dx$

12.  $\int \frac{dx}{x^2(x^2-9)}$

13.  $\int \frac{4x^3-5x^2+8x-10}{(x^2+2)(x-2)^3} dx$

14.  $\int \frac{2x^3+5x^2+14x+7}{(x^2+2x+5)^2} dx$

15.  $\int \frac{-2x^2+8x+8}{(x^2+4)(x-2)^2} dx$

16.  $\int \frac{5x^4+32x^2+48}{x(x^2+4)^2} dx$

17.  $\int \frac{48x^2+32x+3}{(16x^2+1)^2} dx$

18.  $\int \frac{x^3}{x^2+8x+16} dx$

19.  $\int \frac{3x^4+15x^2+5}{x^3+5x} dx$

20.  $\int \frac{3x^3+3x^2+2}{x^2+x} dx$

**Evaluate the improper integral, or state that it diverges.**

21.  $\int_6^{\infty} \frac{dx}{x^2-25}$

22.  $\int_0^{\infty} \frac{2}{4+x^2} dx$

23.  $\int_{-\infty}^0 \frac{14}{(x-1)^2} dx$

24.  $\int_{-\infty}^{-5} \frac{8}{x^3} dx$

25.  $\int_{-\infty}^0 \frac{dx}{\sqrt{x}(64+x)}$

26.  $\int_0^{\infty} 19e^{-19x} dx$

27.  $\int_{-\infty}^{\infty} \frac{x^3}{e^{x^4}} dx$

28.  $\int_{-\infty}^0 25e^x \sin x dx$

29.  $\int_0^{\infty} 15xe^{2x} dx$

**Write the first five elements of the sequence.**

30.  $\left\{ \frac{n+1}{3n-1} \right\}$

31.  $\{ \sin(n\pi) \}$

32.  $a_1 = 1, a_{n+1} = 4a_n$

33.  $a_1 = 1, a_2 = 3, a_{n+2} = a_{n+1} - a_n$

**Find a formula for the nth term of the sequence.**

34.  $1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \frac{1}{25}, \dots$

35.  $0, 2, 0, 2, \dots$

Find the limit of the sequence, or state that it diverges.

$$36. \left\{ \frac{6+8n}{8+5n} \right\}$$

$$37. \left\{ \left( \frac{8}{n} \right) (-1)^n \right\}$$

$$38. a_n = \ln \left( 1 + \frac{8}{n} \right)^n$$

Determine if the sequence is increasing, decreasing, or nonmonotonic, and whether it is bounded.

$$39. a_n = \frac{4n+1}{n+1}$$

$$40. \left\{ \frac{(n+2)!}{(n+1)!} \right\}$$

$$41. \left\{ \frac{(n+3)!}{(3n+1)!} \right\}$$

$$42. a_n = \ln \left( \frac{3}{n} \right)$$

Find a formula for the  $n$ th partial sum of the series; if the series converges, find the sum.

$$43. 3 + \frac{3}{8} + \frac{3}{64} + \dots + \frac{3}{8^{n-1}} + \dots$$

$$44. 5 + 20 + 80 + \dots + 5(4^{n-1}) + \dots$$

Find the sum of the series, or state that it diverges.

$$45. \sum_{n=0}^{\infty} \left( \frac{2}{9^n} \right)$$

$$46. \sum_{n=0}^{\infty} (-1)^n \left( \frac{7}{6^n} \right)$$

$$47. \sum_{n=0}^{\infty} \left( \frac{1}{5^n} - \frac{1}{2^n} \right)$$

$$48. \sum_{n=0}^{\infty} \sqrt{2}$$

$$49. \sum_{n=0}^{\infty} \left( \frac{1}{\sqrt{5}} \right)^n$$

$$50. \sum_{n=0}^{\infty} e^{-3n}$$

$$51. \sum_{n=0}^{\infty} \left( 1 - \frac{2}{n} \right)^{5n}$$

$$52. \sum_{n=0}^{\infty} \frac{\sin \left( \frac{\pi}{2} (n+1) \right)}{4^n}$$

Find the values of  $\chi$  for which the series converges.

$$53. \sum_{n=0}^{\infty} 2^n \chi^n$$

$$54. \sum_{n=0}^{\infty} (\chi - 8)^n$$

$$55. \sum_{n=0}^{\infty} \left[ \frac{\chi - 9}{(-5)} \right]^n$$

$$56. \sum_{n=0}^{\infty} (\chi - 5)^n$$

Determine whether the series converges or diverges.

$$57. \sum_{n=1}^{\infty} \frac{20}{n^{3/2}}$$

$$58. \frac{3n+2}{\sqrt{6n^2+4n+5}}$$

$$59. \sum_{n=1}^{\infty} n^4 e^{-n}$$

$$60. \sum_{n=1}^{\infty} \sin \left( \frac{2n^2+4}{n^2+4} \right)$$

$$61. \sum_{n=1}^{\infty} \frac{14}{\sqrt{n}}$$

$$62. \sum_{n=1}^{\infty} \frac{1}{(\ln 5)^n}$$

$$63. \sum_{n=1}^{\infty} \frac{3\sqrt{n}}{9n^{3/2} + 2n - 10}$$

$$64. \sum_{n=1}^{\infty} \frac{6 - 5(\sin n)}{2n^{5/4} + 3\cos n}$$

$$65. \sum_{n=1}^{\infty} \frac{(\sin n)(\cos n)}{10^n}$$

$$66. \sum_{n=1}^{\infty} \frac{1}{n^2 (\ln n) + 9}$$

$$67. \sum_{n=1}^{\infty} \frac{n!}{e^{2n}}$$

$$68. \sum_{n=1}^{\infty} \frac{(2n)!}{(n!)^2}$$

$$69. \sum_{n=1}^{\infty} \left( \frac{1}{n^6} - \frac{1}{n^9} \right)^n$$

$$70. \sum_{n=1}^{\infty} \frac{n^n}{10n^2}$$