

**Problems for Gateway #1: Convergence and Divergence of an  
Infinite Non-Geometric Series**

1. The series that ***DOES NOT CONVERGE*** is:

- (a)  $1 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \frac{1}{120} + \dots$
- (b)  $1 + 2 + 3 + \dots + 100$
- (c)  $1 + 0.2 + 0.03 + 0.004 + \dots + 0.0000008$
- (d)  $1 + 0.1 + 0.2 + 0.3 + 0.4 + \dots$

2. The series that ***DOES NOT CONVERGE*** is:

- (a)  $1 + 0.1 + 0.02 + 0.003 + 0.0004 + \dots$
- (b)  $1 + 1 + 1 + 1 + \dots$
- (c)  $1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{36} + \dots$
- (d)  $1 + 10 + 100 + 1000 + \dots + 10^{1000000}$

3. The series that ***DOES NOT CONVERGE*** is:

- (a)  $1 + 11 + 101 + 1001 + \dots$
- (b)  $\frac{1}{7} + \frac{1}{14} + \frac{1}{21} + \dots + \frac{1}{77}$
- (c)  $7 + 14 + 21 + 28 + 35 + \dots + 777$
- (d)  $1 + \frac{1}{9} + \frac{1}{25} + \frac{1}{49} + \dots$

4. The series that **CONVERGES** is:

- (a)  $1 + 2 + 3 + 4 + 5 + \dots$
- (b)  $1 + 1 + 1 + 1 + 1 + \dots$
- (c)  $1 + 11 + 101 + 1001 + \dots$
- (d)  $100 + \frac{100}{2} + \frac{100}{6} + \frac{100}{24} + \frac{100}{120} + \dots$

5. The series that **CONVERGES** is:

- (a)  $1 + 1.1 + 1.01 + 1.001 + 1.0001 + \dots$
- (b)  $1 + \frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} + \dots$
- (c)  $1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \dots$
- (d)  $1.1 + 1.2 + 1.3 + 1.4 + 1.5 + \dots$

6. The series that **DOES NOT CONVERGE** is:

- (a)  $1 + 0.1 + 0.01 + 0.001 + \dots$
- (b)  $1 + 2 + 3 + \dots + 1000000$
- (c)  $1 + 0.1 + 0.01 + 0.001 + \dots + 0.0000001$
- (d)  $1 + 2 + 3 + 4 + \dots$

7. The series that **DOES NOT CONVERGE** is:

- (a)  $1 + 0.1 + 0.01 + 0.001 + \dots + 0.0000001$
- (b)  $0.0001 + 0.0001 + 0.0001 + 0.0001 + \dots$
- (c)  $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$
- (d)  $1 + 2^2 + 3^3 + 4^4 + \dots + 1000^{1000}$

8. The series that **DOES NOT CONVERGE** is:

(a)  $1 + 1.1 + 1.01 + 1.001 + \dots$

(b)  $\frac{1}{4} + \left(\frac{1}{4}\right)^2 + \left(\frac{1}{4}\right)^3 + \dots$

(c)  $1 + 2 + 4 + 8 + \dots + 2048$

(d)  $1 + \left(\frac{1}{9}\right)^{10} + \left(\frac{1}{9}\right)^{20} + \left(\frac{1}{9}\right)^{30} + \dots$

9. The series that **CONVERGES** is:

(a)  $1 + 20 + 300 + 4000 + 50000 + \dots$

(b)  $1 + 1.1 + 1.2 + 1.3 + 1.4 + \dots$

(c)  $1 + 2.1 + 3.01 + 4.001 + \dots$

(d)  $1000000 + \frac{1000000}{2} + \frac{1000000}{4} + \frac{1000000}{8} + \dots$

10. The series that **CONVERGES** is:

(a)  $1 + 1 + 1 + 1 + 1 + \dots$

(b)  $1 + 2 + 3 + 4 + 5 + 6 + \dots$

(c)  $1 + \left(\frac{1}{1.01}\right)^2 + \left(\frac{1}{1.01}\right)^4 + \left(\frac{1}{1.01}\right)^6 + \dots$

(d)  $10 + 11 + 12 + 13 + 14 + 15 + \dots$

### Answers

1. D    2. B    3. A    4. D    5. C    6. D  
7. B    8. A    9. D    10. C