

# MathQuest: Series

## Power Series

1. Consider the power series  $\sum_{n=1}^{\infty} \frac{(x-4)^n}{4^n}$ . What values of  $x$  will make this series converge?
  - (a) This series converges for all values of  $x$ .
  - (b) This series converges for all values of  $x$  between 0 and 8.
  - (c) This series converges for all values of  $x$  between -4 and 4.
  - (d) This series converges for all values of  $x$  between -8 and 0.
  - (e) This series diverges for all values of  $x$ .
  
2. Consider the power series  $\sum_{n=1}^{\infty} \frac{(x-4)^n}{4^n}$ . Will this series converge if  $x = 0$  or if  $x = 8$ ?
  - (a) This series converges for both  $x = 0$  and  $x = 8$ .
  - (b) This series does not converge for either  $x = 0$  or  $x = 8$ .
  - (c) This series converges for  $x = 8$  but does not converge for  $x = 0$ .
  - (d) This series converges for  $x = 0$  but does not converge for  $x = 8$ .
  
3. Consider the power series  $\sum_{n=1}^{\infty} \frac{(3x)^n}{n^8}$ . What values of  $x$  will make this series converge?
  - (a) This series converges for all values of  $x$ .
  - (b) This series converges for all values of  $x$  between -3 and 3.
  - (c) This series converges for all values of  $x$  between 0 and 3.
  - (d) This series converges for all values of  $x$  between -1/3 and 1/3.
  - (e) This series diverges for all values of  $x$ .
  
4. Consider the power series  $\sum_{n=1}^{\infty} \frac{(2x)^n}{n^7}$ . Will this series converge if  $x = -1/2$  or if  $x = +1/2$ ?
  - (a) This series converges for both  $x = -1/2$  and  $x = +1/2$ .
  - (b) This series does not converge for either  $x = -1/2$  or  $x = +1/2$ .
  - (c) This series converges for  $x = -1/2$  but does not converge for  $x = +1/2$ .
  - (d) This series converges for  $x = +1/2$  but does not converge for  $x = -1/2$ .

5. Consider the power series  $\sum_{n=1}^{\infty} \frac{(x-8)^n}{n(-6)^n}$ . What values of  $x$  will make this series converge?
- (a) This series converges for all values of  $x$ .
  - (b) This series converges for all values of  $x$  between 2 and 14.
  - (c) This series converges for all values of  $x$  between -8 and 8.
  - (d) This series converges for all values of  $x$  between 0 and 16.
  - (e) This series diverges for all values of  $x$ .
6. Consider the power series  $\sum_{n=1}^{\infty} \frac{(x-5)^n}{n(-3)^n}$ . Will this series converge if  $x = 2$  or if  $x = 8$ ?
- (a) This series converges for both  $x = 2$  and  $x = 8$ .
  - (b) This series does not converge for either  $x = 2$  or  $x = 8$ .
  - (c) This series converges for  $x = 2$  but does not converge for  $x = 8$ .
  - (d) This series converges for  $x = 8$  but does not converge for  $x = 2$ .
7. A power series converges when  $x = 2.5, 2.7$  and  $2.8$ , but diverges when  $x = 2.1, 2.2$  and  $2.9$ . Which of the following could be the point where the power series is centered?
- (a) 2.3
  - (b) 2.6
  - (c) 2.7
  - (d) 2.8
  - (e) All of the above are possible.
  - (f) More than one but not all of the above are possible.