

- Which of these is a definition of a^x for all positive numbers a and all real numbers x ?
(2017-01-11, 1.1, practice)
 - A. $\ln(x \cdot e^a)$
 - B. a multiplied by itself x times
 - C. the unique function for which $\frac{d}{dx}[a^x] = a^x$
 - D. $\exp(x \ln a)$
- Which of these statements is false? (2017-01-11, 1.1, practice)
 - A. $\ln(abc) = \ln(a) + \ln(b) + \ln(c)$
 - B. $\frac{d}{dx}[\ln x] = \frac{1}{|x|}$ for all nonzero numbers x
 - C. $y = \exp(x)$ if and only if $x = \ln(y)$
 - D. $e^x = \exp(x)$

1. The Substitution Rule is the opposite of which derivative rule? (2017-01-19, 2.1)

- A. Chain Rule
- B. Product Rule
- C. Quotient Rule
- D. Power Rule

2. What is incorrect about the following attempt at using the Substitution Rule?

$$\int_0^1 (3 - 2x)^5 dx = \int_0^1 u^5 \left(-\frac{1}{2} du \right)$$

(2017-01-19, 2.1)

- A. dx should have been replaced with $+\frac{1}{2} du$.
- B. u shouldn't be raised to the 5th power.
- C. dx should have been replaced with $-2 du$.
- D. The bounds are incorrect.

3. Which of these formulas would be most useful in finding $\int \sin^4 \theta \cos^2 \theta \, d\theta$? (2017-01-25, 2.2)

A. $\sin^2(\theta) = \frac{1}{2} + \frac{1}{2} \sin(2\theta)$

B. $\cos^2(\theta) = \frac{1}{2} + \frac{1}{2} \cos(2\theta)$

C. $\cos^2(\theta) = 1 - \sin^2(\theta)$

D. $\sin^2(\theta) = 1 - \cos^2(\theta)$

4. Which of these formulas would be most useful in finding $\int \sec^4(\theta) \, d\theta$? (2017-01-25, 2.2)

A. $\sec^2(\theta) = 1 + \tan^2(\theta)$

B. $\sec^2(\theta) = 1 - \tan^2(\theta)$

C. $\tan^2(\theta) = 1 + \sec^2(\theta)$

D. $\tan^2(\theta) = 1 - \sec^2(\theta)$

5. Which of these substitutions would be most useful in finding $\int \frac{1}{25x^2+9} dx$? (2017-01-27, 2.3)
- A. Let $25x^2 + 9 = 25 \sec^2 \theta + 25$.
 - B. Let $25x^2 + 9 = 9 \sin^2 \theta + 9$.
 - C. Let $25x^2 + 9 = 9 \tan^2 \theta + 9$.
 - D. Let $25x^2 + 9 = 25 \cos^2 \theta + 25$.
6. Which of these substitutions would be most useful in finding $\int \frac{1}{x\sqrt{4-16x^2}} dx$? (2017-01-27, 2.3)
- A. Let $4 - 16x^2 = 16 - 16 \cos^2 \theta$.
 - B. Let $4 - 16x^2 = 4 - 4 \sin^2 \theta$.
 - C. Let $4 - 16x^2 = 4 + 4 \tan^2 \theta$.
 - D. Let $4 - 16x^2 = 16 + 16 \sec^2 \theta$.
7. Which of these substitutions would be most useful in finding $\int_3^5 \frac{1}{\sqrt{x^2-9}} dx$? (2017-01-27, 2.3)
- A. Let $x^2 - 9 = 9 \sin^2 \theta + 9$.
 - B. Let $x^2 - 9 = \tan^2 \theta - 1$.
 - C. Let $x^2 - 9 = \cos^2 \theta + 1$.
 - D. Let $x^2 - 9 = 9 \sec^2 \theta - 9$.

8. Which of these sums is the first step in expanding $\frac{4x^2+16x+17}{(x+2)^2(x^2+1)^2}$ into partial fractions?
(2017-02-01, 2.4)
- A. $\frac{A}{x+2} + \frac{Bx}{x+2} + \frac{C}{(x^2+1)^2}$
 - B. $\frac{A}{x+2} + \frac{Bx}{(x+2)^2} + \frac{Cx+D}{(x^2+1)^2}$
 - C. $\frac{A}{x+2} + \frac{B}{(x+2)^2} + \frac{Cx+D}{x^2+1} + \frac{Ex+F}{(x^2+1)^2}$
 - D. $\frac{Ax+B}{(x+2)^2} + \frac{Cx+D}{(x^2+1)^2}$
9. Why must $\frac{3+5x^5}{(x+1)(x+3)^2}$ first be simplified using long polynomial division before using the method of partial fractions? (2017-02-01, 2.4)
- A. It is a rational function of x .
 - B. The degree of its numerator is odd, while the degree of its demoninator is even.
 - C. The degree of its numerator is greater than or equal to the degree of its denominator.
 - D. It is an irrational function of x .

10. Which of these techniques is most appropriate as the first step to find $\int z^2 \sin(z^3) dz$?
(2017-02-09, 2.6)
- A. Integration by Substitution
 - B. Integration by Parts
 - C. Method of Partial Fractions
 - D. Trigonometric Identities
11. Which of these techniques is most appropriate as the first step to find $\int \frac{t^2+3t+1}{t^3+t} dt$?
(2017-02-09, 2.6)
- A. Method of Partial Fractions
 - B. Trigonometric Substitution
 - C. Trigonometric Identities
 - D. Integration by Substitution

12. Which of these integrals represents the area bounded by the curves $x = y^2$ and $x = 4$?
(2017-02-13, 3.1)

A. $\int_0^4 ((\sqrt{x}) - (-\sqrt{x})) \, dx$

B. $\int_0^2 ((x^2) - (4)) \, dx$

C. $\int_2^4 ((x^2) - (-x^2)) \, dx$

D. $\int_2^0 ((x^2) - (\sqrt{x})) \, dx$

Answer the following questions about the solid of revolution obtained by rotating the triangle with vertices $(1, 1)$, $(2, 2)$, $(2, 3)$ around the line $y = -1$.

13. Which of these curves should be used to find the outer radius $R(x)$? (2017-02-16, 3.3)

- A. $y = \frac{1}{2}x$
- B. $y = 2x - 1$
- C. $y = -2x + 2$
- D. $y = -\frac{1}{2}x + 1$

14. What formula should be used for $R(x)$? (2017-02-16, 3.3)

- A. $R(x) = 2x$
- B. $R(x) = 1 - 2x$
- C. $R(x) = 2 - \frac{1}{2}x$
- D. $R(x) = \frac{1}{2}x - 1$

15. What are the correct bounds for the washer method integral? (2017-02-16, 3.3)

- A. $\pi \int_{-1}^3 ([R(x)]^2 - [r(x)]^2) dx$
- B. $\pi \int_2^3 ([R(x)]^2 - [r(x)]^2) dx$
- C. $\pi \int_1^2 ([R(x)]^2 - [r(x)]^2) dx$
- D. $\pi \int_0^2 ([R(x)]^2 - [r(x)]^2) dx$

16. In the work integral $\int_a^b F(x) dx$, the function $F(x)$ represents... (2017-02-24, 3.5)
- A. Friction
 - B. Speed
 - C. Force
 - D. Mass
17. When computing the work done in pumping water out of a container, the video suggests using which formula? (2017-02-24, 3.5)
- A. $\int_{y=c}^{y=d} dW$
 - B. $\int_a^b F(x) dx$
 - C. $\int_a^b \frac{W(x)}{x} dx$
 - D. $\int_{y=c}^{y=d} yF(y) dy$

18. The equations $x = 3 + 4 \cos(t)$, $y = -2 + 4 \sin(t)$ for $0 \leq t \leq 2\pi$ parametrize which kind of curve? (2017-03-01, 4.1)
- A. A parabola
 - B. A line segment
 - C. A circle oriented counter-clockwise
 - D. A circle oriented clockwise
19. The equations $x = 3 + 4t$, $y = -2 + 4t$ for $0 \leq t \leq 2\pi$ parametrize which kind of curve? (2017-03-01, 4.1)
- A. A parabola
 - B. A line segment
 - C. A circle oriented counter-clockwise
 - D. A circle oriented clockwise

20. The formula $\frac{dy}{dt} = \frac{dy}{dx} \frac{dx}{dt}$ for computing the slope of a tangent line to a curve defined by parametric equations is a result of the... (2017-03-02, 4.2)
- A. Product Rule
 - B. Pythagorean Theorem
 - C. Method of Partial Fractions
 - D. Chain Rule
21. The formula $L = \int_a^b \sqrt{[dx/dt]^2 + [dy/dt]^2} dt$ for computing arclength is a result of the... (2017-03-02, 4.2)
- A. Product Rule
 - B. Pythagorean Theorem
 - C. Method of Partial Fractions
 - D. Chain Rule

22. Find the first few terms of the sequence defined recursively by $a_0 = 1$, $a_1 = 2$, $a_{n+2} = 2a_n + a_{n+1}$. (2017-03-22, 5.1)
- A. $\langle 1, 2, 3, 4, 5, \dots \rangle$
 - B. $\langle 1, 2, 3, 5, 8, \dots \rangle$
 - C. $\langle 1, 2, 4, 8, 16, \dots \rangle$
 - D. $\langle 1, 2, 4, 7, 15, \dots \rangle$
23. The limit $\lim_{n \rightarrow \infty} \frac{n}{1 + n^2}$ is equal to which of the following limits? (2017-03-22, 5.2)
- A. $\lim_{n \rightarrow 0} \frac{1 + n^2}{n}$
 - B. $\lim_{x \rightarrow \infty} \frac{x}{1 + x^2}$
 - C. $\lim_{x \rightarrow 0} \left(x + \frac{1}{x} \right)$
 - D. $\lim_{n \rightarrow \infty} \left(n + \frac{1}{n} \right)$
24. Which of the following describes the sequence $\langle (-\frac{2}{3})^n \rangle_{n=0}^\infty = \langle 1, -\frac{2}{3}, \frac{4}{9}, -\frac{8}{27}, \dots \rangle$? (2017-03-22, 5.2)
- A. It is bounded and monotonic, and therefore convergent by the Monotonic Sequence Theorem.
 - B. It is bounded and convergent, but not monotonic.
 - C. It is monotonic, but not bounded nor convergent.
 - D. It is convergent and monotonic, but not bounded.

25. Which of the following statements about the sequence $\langle (\frac{1}{2})^n \rangle_{n=0}^\infty = \langle 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \dots \rangle$ is false?
(2017-03-27, 5.3)
- A. The sequence is bounded and monotonic, and therefore convergent by the Monotonic Sequence Theorem.
 - B. Its partial sum sequence $\langle 1, 1 + \frac{1}{2}, 1 + \frac{1}{2} + \frac{1}{4}, \dots \rangle = \langle 1, \frac{3}{2}, \frac{7}{4}, \dots \rangle$ is bounded and monotonic, and therefore convergent by the Monotonic Sequence Theorem.
 - C. Its corresponding series $\sum_{n=0}^\infty (\frac{1}{2})^n = 1 + \frac{1}{2} + \frac{1}{4} + \dots$ converges to $\frac{1}{1-\frac{1}{2}} = 2$.
 - D. Its corresponding series $\sum_{n=0}^\infty (\frac{1}{2})^n = 1 + \frac{1}{2} + \frac{1}{4} + \dots$ is an infinite sum and therefore does not exist.

26. Which of these techniques is NOT valid for determining the convergence of $\sum_{n=0}^{\infty} \left(\frac{1}{e}\right)^n$?

(2017-03-31, 5.5)

A. Geometric Series: converges to $\frac{1}{1+\frac{1}{e}}$ because $|\frac{1}{e}| < 1$

B. Series Convergence Test: converges because $\lim_{n \rightarrow \infty} \frac{1}{e^n} = 0$.

C. Integral Test: converges because $\int_0^{\infty} e^{-x} dx$ converges

27. Which of these series converges? (2017-03-31, 5.5)

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

B. $\sum_{n=3}^{\infty} \frac{1}{n}$

C. $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n-1}}$

D. $\sum_{n=4}^{\infty} \frac{1}{n^{1/3}}$

28. Describe $\sum_{j=0}^{\infty} \frac{4^j + 1}{3^{j+1}}$ and $\sum_{k=4}^{\infty} \frac{k}{k^2 - 4}$. (2017-04-10, 5.7)
- A. Both converge.
 - B. The first converges, and the second diverges.
 - C. The first diverges, and the second converges.
 - D. Both diverge.
29. Describe $\sum_{m=8}^{\infty} \frac{m + 3^m}{m!}$ and $\sum_{n=5}^{\infty} \frac{2}{n + \ln(n)}$. (2017-04-10, 5.7)
- A. Both converge.
 - B. The first converges, and the second diverges.
 - C. The first diverges, and the second converges.
 - D. Both diverge.

30. Which of the following power series is equal to $1 - x + \frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{24} - \frac{x^5}{120} + \dots$? (2017-04-14, 6.1)

A. $\sum_{n=0}^{\infty} \frac{(-x)^n}{n!}$

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

C. $\sum_{n=1}^{\infty} \frac{(-x)^n}{3^n}$

D. $\sum_{n=0}^{\infty} 2\left(\frac{x}{3}\right)^n$

31. The function $f(x) = \sum_{n=0}^{\infty} 2\left(\frac{x}{3}\right)^n$ with domain $|x| < 3$ may be simplified to $f(x) = \frac{2}{1-x/3}$ because it is... (2017-04-14, 6.1)

A. a telescoping series.

B. a geometric series.

C. a ratio series.

D. an alternating series.

32. (2017-04-18, 6.2)

A.

B.

C.

D.

33. (2017-04-18, 6.2)

A.

B.

C.

D.

34. (2017-04-24, 6.3)

A.

B.

C.

D.

35. (2017-04-24, 6.3)

A.

B.

C.

D.

36. (2017-04-27, 6.4)

A.

B.

C.

D.

37. (2017-04-27, 6.4)

A.

B.

C.

D.