**Section 8.4**
Level: Easy

Which trig identity should you use to integrate

$$\int \sin^5(x)dx$$

**A** $\sin^2(x) + \cos^2(x) = 1$

**B** $\sin^2(x) = \frac{1-\cos(2x)}{2}$

**C** $\cos^2(x) = \frac{1+\cos(2x)}{2}$

**Section 8.4**
Level: Easy

For $\int \sin^3(x)\cos(x)dx$ substitute $u =$

**A** $\sin^3(x)$

**B** $\sin(x)$

**C** $\cos(x)$

**Section 8.4**
Level: Easy

Which trig identity should you use to integrate

$$\int \sin^4(x)dx$$

**A** $\sin^2(x) + \cos^2(x) = 1$

**B** $\sin^2(x) = \frac{1-\cos(2x)}{2}$

**C** $\cos^2(x) = \frac{1+\cos(2x)}{2}$

**Section 8.4**
Level: Easy

Which trig identity should you use to integrate

$$\int \sin^2(x)\cos^3(x)dx$$

**A** $\sin^2(x) + \cos^2(x) = 1$

**B** $\sin^2(x) = \frac{1-\cos(2x)}{2}$

**C** $\cos^2(x) = \frac{1+\cos(2x)}{2}$

**Section 8.4**
Level: Hard

With
$s = \sin, c = \cos$,
$$\int \sin^3(x)\cos^2(x)dx =$$

**A** $\dfrac{c^5x}{5} - \dfrac{c^3x}{3} + C$

**B** $\dfrac{c^6x}{6} - \dfrac{c^4x}{4} + C$

**C** $\dfrac{c^4x}{4} - \dfrac{s^3x}{3} + C$

**D** $\dfrac{c^3x}{3} + \dfrac{s^2x}{2} + C$

**E** $-c^3x \cdot s^2x + C$

**Section 7.1**
Level: Easy

Are the graphs $y = x^2$ and $x = y^2$ functions?

**A** Both graphs are NOT functions

**B** $x = y^2$ is the only function

**C** Both graphs are functions

**D** $y = x^2$ is the only function

**Section 7.1**
Level: Hard

When does $f(x) = \frac{ax+b}{cx+d}$ have an inverse?

**A** $da - cb \neq 0$

**B** $ab - cd \neq 0$

**C** $da - b > 0$

**D** $ba - dc < 0$

**E** We cannot determine without knowing the values.

**Section 7.1**
Level: Easy

If is differentiable then f is one-to-one.

**A** True

**B** False

**Section 7.7**
Level: Easy

What is the domain of $\operatorname{asin}(x)$

**A** $[-\frac{\pi}{2}, \frac{\pi}{2}]$

**B** $[0, \pi]$

**C** $[-1, 1]$

**Section 7.7**
Level: Easy

Rewrite $4x - x^2$ by completing the square

**A** $4 - (x-2)^2$

**B** $4 + (x-2)^2$

**C** $(x-2)^2 - 4$

**Section 7.7**
Level: Hard

Simplify

$\sin(\operatorname{acos}(\frac{y^4}{9}))$

**A** $\frac{y^4}{9}$

**B** $\frac{\sqrt{81-y^8}}{9}$

**C** $\frac{9-y^4}{9}$

**D** $y^4$

**Section 7.7**
Level: Easy

Identify $\frac{d}{dx}\operatorname{asin}(x)$

**A** $\frac{1}{\sqrt{1-x^2}}$

**B** $\frac{1}{1+x^2}$

**C** $\frac{1}{|x|\sqrt{x^2-1}}$

**Section 7.7**
Level: Easy

Identify $\frac{d}{dx}\operatorname{atan}(x)$

**A** $\frac{1}{\sqrt{1-x^2}}$

**B** $\frac{1}{1+x^2}$

**C** $\frac{1}{|x|\sqrt{x^2-1}}$

**Section 7.7**
Level: Easy

Identify $\frac{d}{dx}\operatorname{asec}(x)$

**A** $\frac{1}{\sqrt{1-x^2}}$

**B** $\frac{1}{1+x^2}$

**C** $\frac{1}{|x|\sqrt{x^2-1}}$

**Section 7.7**
Level: Easy

Identify

$$\int \frac{1}{\sqrt{1-x^2}}dx$$

**A** $\operatorname{asec}(x) + C$

**B** $\operatorname{atan}(x) + C$

**C** $\operatorname{asin}(x) + C$

**Section 7.7**
Level: Easy

Identify $\displaystyle\int \frac{1}{1+x^2}dx$

**A** $\operatorname{asec}(x) + C$

**B** $\operatorname{atan}(x) + C$

**C** $\operatorname{asin}(x) + C$

**Section 7.7**
Level: Easy

Identify

$$\int \frac{1}{x\sqrt{x^2-1}}dx$$

**A** $\operatorname{asec}(x) + C$

**B** $\operatorname{atan}(x) + C$

**C** $\operatorname{asin}(x) + C$

**Section 7.2**
Level: Easy

$\ln\left(\frac{(x^2+1)^5}{\sqrt{1-x}}\right) =$

**A** $\dfrac{5\ln(x^2+1)}{\frac{1}{2}\ln(1-x)}$

**B** $5\ln(x^2+1) + \ln(1-x)$

**C** $5\ln(x^2)\ln(1) - \frac{1}{2}\ln(1)\ln(-x)$

**D** $5\ln(x^2+1) - \frac{1}{2}\ln(1-x)$

**Section 7.2**
Level: Hard

Which interval is $x - 4\ln(x+1)$ one-to-one

**A** $(0, \infty)$

**B** $(0, e-1)$

**C** $(3, \infty)$

**D** $(\frac{e}{4} - 1, \infty)$

**Section 7.2**
Level: Easy

What is $\frac{d}{dx}\ln(x)$?

**A** $e^x$

**B** $x^0$

**C** $\frac{1}{x}$

**Section 7.2**
Level: Easy

What is $\ln(e)$?

**A** 0

**B** 1

**C** $e$

**Section 7.2**
Level: Easy

What is $\int \frac{1}{x} dx$?

**A** 1

**B** $x^0$

**C** $\ln(x)$

**D** $e$

**Section 7.2**
Level: Easy

How can we rewrite $\log_a(x)$ in terms of $\ln$?

**A** $\dfrac{\ln(a)}{\ln(x)}$

**B** $\dfrac{\ln(x)}{\ln(a)}$

**C** It cannot be done

**Section 7.2**
Level: Easy

For $\int \tan(x)dx$ substitute $u =$?

**A** $\sin(x)$

**B** $\cos(x)$

**C** $\tan(x)$

**Section 7.3**
Level: Hard

The set of all points $(e^t, t)$ where t is a real number is the graph of y=

**A** $\frac{1}{e^x}$

**B** $e^{\frac{1}{x}}$

**C** $e^x$

**D** $\frac{1}{\ln(x)}$

**E** $\ln(x)$

**Section 7.3**
Level: Easy

What is the Domain of $e^x$

**A** $(0, \infty)$

**B** $(-\infty, \infty)$

**C** $[0, 1]$

**Section 7.3**
Level: Easy

Simplify $e^{\ln(x^2+1)}$

**A** $e^{x^2+1}$

**B** $\ln(x^2+1)$

**C** $x^2+1$

**Section 7.3**
Level: Easy

For $\int \frac{e^{\sqrt{r}}}{\sqrt{r}} dr$ substitute $u =$

**A** $e^{\sqrt{r}}$

**B** $\sqrt{r}$

**C** $\frac{1}{\sqrt{r}}$

$$\int \frac{e^x + 1}{e^x} dx = ?$$

under the substitution

**A** $\int \frac{u}{u-1} du, u = e^x + 1$

**B** $\int -(1 + e^u) du, u = -x$

**C** $\int \frac{u+1}{u} du, u = e^x$

**D** $\int u du, u =$

**Section 7.3**
Level: Easy

**Section 7.3**
Level: Easy

What is $\frac{d}{dx}4^x$?

**A** $x4^{x-1}$

**B** $\frac{1}{\ln(4)}4^x$

**C** $\ln(4)4^x$

**Section 9.1**
Level: Hard

Which is a general solution to
$y' + 2y = e^{-x}$

**A** $y(t) = 2e^{-x} + C$

**B** $y(t) = Ce^{-x}$

**C** $y(t) = e^{-2x} + Ce^{-x}$

**D** $y(t) = Ce^{-2x} + e^{-x}$

**E** $y(t) = e^{-2x} + e^{-Cx}$

**Section 9.1**
Level: Hard

Which is a general solution to $y' + y = \frac{2}{1+4e^{2x}}$

**A** $(\operatorname{atan}(2e^x) + C)e^{-x}$

**B** $\frac{\cos(x)}{x} + C$

**C** $(\operatorname{asec}(2e^x) + C)e^{-x}$

**Section 9.1**
Level: Easy

Which of the following differential equations is separable?

**A** $y' = e^{-t^2} - 2yt$

**B** $xy' + y = -\sin(x)$

**C** $y' = \frac{1}{x}(2 - y)$

**Section 9.1**
Level: Easy

Which of the following is a first-order differential equation

**A** $y' + y = e^x$

**B** $\dfrac{d^2y}{dt^2} = 2$

**C** $y'' + 2y = 4$

**Section 7.5**
Level: Hard

If $f'(x) = -f(x)$ and $f(1) = 1$ then f(x)=

**A** $1/2e^{-2x+2}$

**B** $e^{-x-1}$

**C** $e^{1-x}$

**D** $e^{-x}$

**E** $-e^{x}$

**Section 7.5**
Level: Easy

What is the solution to $\frac{dy}{dx} = Ky$

**A** $\cos(Kx) + C$

**B** $Ce^{Kx}$

**C** $Ky + C$

**Section 7.5**
Level: Hard

If $f(t) = 3000e^{2t/5}$ and $f(t_1) = 7,500$, find $f(t_1 + 5)$

**A** $1200e^2$

**B** $3000e^2$

**C** $7500e^2$

**D** $7500e^5$

**E** $15000/7e^7$

**Section 8.1**
Level: Easy

For $\int \frac{e^{4x}}{1+e^{4x}}dx$ substitute $u =$

**A** $1 + e^{4x}$

**B** $e^{4x}$

**C** $1 + 4x$

**Section 8.1**
Level: Easy

How do you evaluate $\int \frac{1}{x^2+4}$

**A** u-substitution

$$u = x^2 + 4$$

**B** inverse trig

**Section 8.1**
Level: Easy

How do you evaluate $\int \frac{x}{x^2+4}$

**A** u-substitution

$$u = x^2 + 4$$

**B** inverse trig

**Section 8.1**
Level: Easy

How do you evaluate $\int \frac{1}{x^2+10x+26} dx$

**A** u-substitution $u = x^2+10x+26$

**B** Complete the square, its natural log

**C** Complete the square, its inverse trig

**Section 8.1**
Level: Easy

Which integral can**not** become $\int w^n dw$ by substitution?

**A** $\int x \sin(x^2) dx$

**B** $\int \frac{1}{x \ln(x)} dx$

**C** $\int \frac{1}{\tan(x)} dx$

**D** $\int x^2(x^3 + 3) dx$

**Section 8.1**
Level: Easy

Which integral can**not** become $\int w^n dw$ by substitution?

**A** $\displaystyle\int \frac{4x^3+3}{\sqrt{x^4+3x}}dx$

**B** $\displaystyle\int \frac{e^x-e^{-x}}{(e^x+e^{-x})^3}dx$

**C** $\displaystyle\int \frac{2x}{\sqrt{x^2+1}}dx$

**D** $\displaystyle\int \frac{\sin(x)}{x}dx$

**Section 8.2**
Level: Easy

For $\int e^{2x}(3x)dx$ by parts $u =$

**A** $e^{2x}$

**B** $3x$

**Section 8.2**
Level: Easy

For $\int x \sin(x) dx$ by parts $v' =$

**A** $\sin(x)dx$

**B** $xdx$

**Section 8.2**
Level: Hard

For $\int x^2 \sin(x) dx$, how many times integrate by parts?

**A** 1

**B** 2

**C** 3

**Section 8.2**
Level: Easy

For $\int \operatorname{asin}(t)dt$ by parts $u =$

**A** $\operatorname{asin}(t)$

**B** $1$

**C** You don't use integration by parts for this problem

**Section 8.2**
Level: Easy

For $\int \frac{\ln(t)}{t} dt$ by parts $u =$

**A** $\ln(t)$

**B** $\frac{1}{t}$

**C** $t$

**Section 8.2**
Level: Hard

By parts $\int x \cdot \operatorname{atan}(x) dx =$ $A - \int B dx$ What is B?

**A** $\dfrac{1+x^2}{2x}$

**B** $\dfrac{2x}{1+x^2}$

**C** $\dfrac{\operatorname{atan}(x)x^2}{2}$

**D** $\dfrac{x^2}{1-x^2}$

**Section 8.2**
Level: Easy

Integration by parts $u = x$ and $v' =$(rest) is a reasonable choice for

**A** $\int x(\ln x)^2 dx$

**B** $\int x^2 e^{x^3} dx$

**C** $\int x \sin(x) dx$

**D** $\int \frac{x}{\ln x} dx$

**Section 8.3**
Level: Easy

Which of the following is in the partial fraction decomposition of

$$\frac{(1+10x)^2}{(x^3-x)^2(x^2-4x+3)}$$

**A** $(A+Bx)^3$

**B** $\dfrac{A}{x}$

**C** $\dfrac{Ax+B}{x^3-x}$

**D** $\dfrac{A}{x-4}$

**Section 8.3**
Level: Easy

Which of the following is in the partial fraction decomposition of

$$\frac{(1+10x)^2}{(x^3-x)^2(x^2-4x+3)}$$

**A** $Ax + B$

**B** $\dfrac{A}{x^3}$

**C** $\dfrac{Ax+B}{(x^2-1)^2}$

**D** $\dfrac{A}{x+4}$

**Section 8.3**
Level: Hard

What is the remainder when you divide $x^4 + x^2 + 1$ by $x^3 + x$.

**A** 1

**B** x

**C** $\frac{1}{x}$

**Section 8.3**
Level: Easy

Which of the following are terms in the partial fraction decomposition of

$$\frac{x+8}{x^2+6x+8}$$

**A** $\dfrac{A}{x-2}$

**B** $\dfrac{A}{(x+4)^2}$

**C** $\dfrac{A}{x+2}$

$\dfrac{A}{}$

**Section 8.3**
Level: Easy

Which integration technique should be used to evaluate $\int \frac{2+5x}{(1+x)^2}$

**A** integration by parts

**B** u-substitution $u = 1 + x$

**C** Partial Fraction Decomposition

**D** Inverse Trig Functions

**Section 8.3**
Level: Easy

Which integration technique should be used to evaluate $\int \frac{2}{(1+x^2)^2}$

**A** integration by parts

**B** u-substitution $u = 1 + x$

**C** Partial Fraction Decomposition

**D** Inverse Trig Functions

**Section 8.5**
Level: Easy

Which of the following integrals yield an $\mathrm{asin}$ function upon integration after an appropriate substitution?

**A** $\displaystyle\int \frac{x}{4-x^2}dx$

**B** $\displaystyle\int \frac{4}{4+x^2}dx$

**C** $\displaystyle\int \frac{x}{\sqrt{4-x^2}}dx$

**Section 8.5**
Level: Easy

To evaluate $\int \frac{x^3}{\sqrt{1-x^2}} dx$ which trig substitution should we make?

**A** $x = \sin(\theta)$

**B** $x = \tan(\theta)$

**C** $x = \sec(\theta)$

**Section 8.5**
Level: Easy

To evaluate $\int \sqrt{1-x^2}dx$ which trig substitution should we make?

**A** $x = \sin(\theta)$

**B** $x = \tan(\theta)$

**C** $x = \sec(\theta)$

**Section 8.5**
Level: Easy

To evaluate $\int \frac{2}{x^3\sqrt{x^2-1}}dx$ which trig substitution should we make?

**A** $x = \sin(\theta)$

**B** $x = \tan(\theta)$

**C** $x = \sec(\theta)$

**Section 8.5**
Level: Easy

To evaluate $\int \frac{x+2}{\sqrt{(9x^2+4)^3)}} dx$ which trig substitution should we make?

**A** $x = 2/3 \sin(\theta)$

**B** $x = 2/3 \tan(\theta)$

**C** $x = 2/3 \sec(\theta)$

**Section 8.5**
Level: Hard

To evaluate $\int \frac{1}{(x-1)^2\sqrt{x^2-2x}}dx$ which trig substitution should we make?

**A** $(x-1) = \sin(\theta)$

**B** $(x-1) = \tan(\theta)$

**C** $(x-1) = \sec(\theta)$

**Section 8.5**
Level: Easy

For $\int \frac{1}{\sqrt{6x - x^2 - 8}} dx$ use

**A** Integration by parts

**B** Partial Fractions

**C** Long Division

**D** Completing the Square

**Section 8.5**
Level: Easy

For $\int \frac{x^2}{\sqrt{1-x^2}} dx$ use

**A** Integration by Parts

**B** Partial Fractions

**C** Long Division

**D** Completing the square

**E** A trig subsitution

**Section 8.5**
Level: Easy

For $\int x \sin(x) dx$ use

**A** Integration by Parts

**B** Partial Fractions

**C** Long Division

**D** Completing the square

**E** A trig subsitution

**Section 8.8**
Level: Easy

$\int_1^\infty \frac{1}{x^2} dx$ does

**A** converge

**B** diverge

**Section 8.8**
Level: Easy

$\int_1^\infty \frac{1}{\sqrt{x}} dx$ does

**A** converge

**B** diverge

**Section 8.8**
Level: Easy

Which are improper integrals?

**A** $\displaystyle\int_1^{\infty} \frac{\sin(x)}{x} dx$

**B** $\displaystyle\int_4^5 \frac{1}{x} dx$

**C** $\displaystyle\int_{-10}^{10} f(x) dx$
where

$$f(x) = \begin{cases} \frac{1}{x} + 2 & -10 \leq x \leq \\ \frac{1}{x+2} & -1 \leq x \leq \end{cases}$$

**Section 8.8**
Level: Easy

For which functions f(t) is $\lim_{t \to 0^+} f(t) = \infty$ but $\int_0^1 f(t)dt$ is finite

**A** $f(t) = \frac{1}{t}$

**B** $f(t) = \frac{1}{t^{1/2}}$

**C** $f(t) = \frac{1}{t^3}$

**Section 8.8**
Level: Easy

For which functions f(t) is $\lim_{t\to\infty} f(t) = 0$ but $\int_1^\infty f(t)dt$ diverges

**A** $f(t) = \frac{1}{t^2}$

**B** $f(t) = \frac{1}{t^{1/2}}$

**C** $f(t) = \frac{1}{t^3}$

**Section 8.8**
Level: Easy

Does the integral $\int_1^\infty e^{-x}dx$ converge or diverge?

**A** converge

**B** diverge

**Section 8.8**
Level: Easy

Does the integral $\int_1^\infty \frac{1}{\ln(x)} dx$ converge or diverge?

**A** converge

**B** diverge

**Section 8.8**
Level: Hard

Does the integral $\int_1^\infty \frac{1}{x^2+2}dx$ converge or diverge?

**A** converge

**B** diverge

**Section 8.8**
Level: Hard

Does the integral $\int_{\pi}^{\infty} \frac{2+\cos(x)}{x} dx$ converge or diverge?

**A** converge

**B** diverge

**Section 7.6**
Level: Easy

Which of the following functions has smaller growth?

**A** $\dfrac{1}{x^2 + x}$

**B** $\dfrac{1}{x^2}$

**C** $\dfrac{1}{x^3}$

**Section 7.6**
Level: Easy

Which of the following functions grows faster than $e^x$

**A** $x + 3$

**B** $4^x$

**C** $e^x/2$

**Section 7.6**
Level: Easy

Which of the following functions grows faster than $x^2$

**A** $x + 3$

**B** $x^3$

**C** $\ln(x^3 + 2)$

**Section 7.6**
Level: Easy

Which of the following functions grows at the same rate as $\dfrac{1}{\sqrt{x^2+1}}$

**A** $\dfrac{1}{x}$

**B** $\dfrac{1}{x^2}$

**C** $\dfrac{1}{\sqrt{x}}$

**Section N1**

Level: Easy

Which of the following would you compare $\dfrac{x^3+x^2+1}{x^4-x^2}$ to

**A** x

**B** $\dfrac{1}{x}$

**C** $\dfrac{1}{x^4}$

**Section N1**
Level: Easy

Which of the following would you compare $\dfrac{2}{x^2 - \sqrt{x}}$ to

**A** $\dfrac{1}{x}$

**B** $\dfrac{1}{\sqrt{x}}$

**C** $\dfrac{1}{x^2}$

**Section N1**
Level: Easy

Which of the following would you compare $\frac{\ln(x)}{x}$ to

**A** $\frac{1}{x}$

**B** $\frac{1}{\sqrt{x}}$

**C** $\frac{1}{x^2}$

**Section N1**
Level: Hard

Which of the following would you compare $\sin(\frac{1}{x})$ to

**A** $\cos(\frac{1}{x})$

**B** $\frac{1}{\sqrt{x}}$

**C** $\frac{1}{x}$

**Section N1**
Level: Hard

What are all the values of p, for which $\int_1^\infty \frac{2}{x^{p+1}} dx$ converges?

**A** $p < -1$

**B** $p > 0$

**C** $p > 1$

**D** $p > 2$

**E** There are no values of p for which the

**Section 11.1**
Level: Easy

Identify $a_n$ for the sequence
$2, 4, 6, 8, \ldots$

**A** $2^n$

**B** $n + 2$

**C** $2n$

**Section 11.1**
Level: Easy

Identify $a_n$ for the sequence
$1, -\frac{1}{4}, \frac{1}{9}, -\frac{1}{16}, \ldots$

**A** $\dfrac{(-1)^{n+1}}{2n}$

**B** $\dfrac{1}{(-2)^n}$

**C** $\dfrac{(-1)^{n+1}}{n^2}$

**Section 11.1**
Level: Hard

Identify $a_n$ for the sequence
$0, 3, 8, 15, 24, ldots$

**A** $n + (2n - 1)$

**B** $n^2 - 1$

**C** $2^n - 1$

**Section 11.1**
Level: Easy

The statement $\lim_{n\to\infty} a_n = L$ means that for each $\epsilon > 0$ there exists an N such that

**A** If $|\frac{1}{n}| \leq \epsilon$, then $|a_n - L| < N$

**B** If $|a_n - L| \leq \epsilon$, then $n \geq N$

**C** If $|a_n - a_N| < \epsilon$, then $L < n$

**D** If $n \geq N$, then

**Section 11.1**
Level: Easy

Which of the following sequences has this graph
Section111.eps

**A** $\dfrac{8}{n+1}$

**B** $\dfrac{8n}{n+1}$

**C** $4(.5)^{n-1}$

**D** $\dfrac{4^n}{n!}$

**Section 11.1**
Level: Easy

Identify the value of the $\lim_{n\to\infty} \frac{1-2n}{1+2n}$

**A** -1

**B** 0

**C** 1

**D** $\infty$

**Section 11.1**
Level: Easy

Identify the value of the $\lim_{n\to\infty} \frac{\sin n}{n}$

**A** 1

**B** 0

**C** DNE

**D** $\infty$

**Section 11.1**
Level: Easy

Identify the value of the $\lim_{n\to\infty} 2 + (-0.1)^n$

**A** 2

**B** 1

**C** DNE

**D** 0

**Section 11.1**
Level: Hard

Identify the value of the $\lim_{n\to\infty} \frac{\ln(n)}{\ln(2n)}$

**A** $\infty$

**B** 0

**C** DNE

**D** 1

**Section 11.1**
Level: Hard

Consider the following three sequences:
$a_n = (-1)^n$,
$b_n = (-1)^n/n$,
$c_n = 2^{-n}$

**A** $\{a_n\}$ and $\{b_n\}$ converge; $\{c_n\}$ diverges

**B** $\{a_n\}$ and $\{c_n\}$ converge; $\{b_n\}$ diverges

**C** $\{a_n\}$ and $\{c_n\}$

**Section 11.2**
Level: Easy

True or False: If $\lim_{n\to\infty} a_n = 0$ then $\sum_{n=0}^{\infty} a_n$ converges.

**A** True

**B** False

**Section 11.2**
Level: Easy

Determine the general term for the following series

$$x^2+\frac{x^4}{2}+\frac{x^6}{6}+\frac{x^8}{24}+\frac{x^10}{120}+\cdots$$

**A** $\dfrac{2x^n}{n!}$

**B** $\dfrac{x^{2n}}{n!}$

**C** $\dfrac{x^{n+2}}{(2n)!}$

**D** None of the above

**Section 11.2**
Level: Hard

Which of the following series are geometric?

**A** $1 - 1/2 + 1/4 - 1/6 + \ldots$

**B** $2y - 6y^3 + 18y^5 - 54y^7 + \ldots$

**C** $1/2 + 2/3 + 3/4 + 4/5 + \ldots$

**D** $x + x^2 + x^4 + x^7 + \ldots$

**Section N2**
Level: Easy

What is the value of the series $\sum_{n=0}^{\infty} \frac{(-1)^n}{4^n}$

**A** $\frac{1}{4}$

**B** $\frac{4}{5}$

**C** The series doesn't converge

**Section N2**
Level: Easy

What is the formula for $\sum_{i=1}^{k} ar^{i-1}$

**A** $\dfrac{a}{1-r}$

**B** $\dfrac{a(1-r^k)}{1-r}$

**C** The series doesn't converge

**Section N2**
Level: Easy

Which of the following is not an example of geometric growth?

**A** An endowment

**B** Earning annual interest on an account

**C** A population doubling each year

**D** All of the above are examples of

**Section N2**
Level: Hard

Which of the following is a correct reindex of $\sum_{n=1}^{\infty} \frac{n}{2n-1}$?

**A** $\sum_{n=2}^{\infty} \frac{n-1}{2n-3}$?

**B** $\sum_{n=2}^{\infty} \frac{n-1}{2n-2}$?

**C** $\sum_{n=2}^{\infty} \frac{n+1}{2n+1}$?

**Section N3**
Level: Easy

For what values of p does the series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converge?

**A** $p > 1$

**B** $p < 1$

**C** $p \geq 1$

**D** $p = 1$

**Section N3**
Level: Hard

True or False

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{1}{1-(1/n^2)}$$

**A** True

**B** False

**Section N3**
Level: Easy

Which series should we use to decide if $\sum_{n=1}^{\infty} \frac{1}{e^n}$ converges

**A** $\sum_{n=1}^{\infty} \frac{1}{n}$?

**B** $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$?

**C** $\sum_{n=1}^{\infty} \frac{1}{n^2}$?

**Section N3**
Level: Easy

Which series should we use to decide if $\sum_{n=1}^{\infty} \frac{\sin^2(n)}{n^3}$ converges

**A** $\sum_{n=1}^{\infty} \frac{1}{n}$?

**B** $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$?

**C** $\sum_{n=1}^{\infty} \frac{1}{n^3}$?

**Section N3**
Level: Easy

Which series should we use to decide if $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n+4}}$ converges

**A** $\sum_{n=1}^{\infty} \frac{1}{n}$?

**B** $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$?

**C** $\sum_{n=1}^{\infty} \frac{1}{n^2}$?

**Section 11.5**
Level: Easy

In the statement of the Ratio test $\lim_{n\to\infty} \frac{a_{n+1}}{a_n} = \rho$ we conclude the series $\sum a_n$ converges if

**A** $\rho = 1$

**B** $\rho \neq 1$

**C** $\rho > 1$

**D** $\rho < 1$

**Section 11.5**
Level: Easy

Which of the following is equal to $(n+1)!$

**A** $n+1+n!$

**B** $(n+1)n!$

**C** $n^n+1^n$

**Section 11.5**
Level: Easy

We can simplify $2^{n+1}$ to

**A** $2^n + 1$

**B** $2^n + 2^1$

**C** $2(2^n)$

**Section 11.6**
Level: Easy

We can rearrange terms in a series which does not converge absolutely so that the value of the series equals two different values.

**A** True

**B** False

**Section 11.6**
Level: Easy

The series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$ converges absolutely

**A** True

**B** False

**Section 11.6**
Level: Easy

The series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$ converges

**A** True

**B** False

**Section N4**
Level: Easy

To compute the interval of convergence for a power series you use

**A** Integral Test

**B** Ratio Test

**C** Comparison Test

**D** Root Test

**Section N4**
Level: Easy

To express $\dfrac{9}{x^3+3x^2-4}$ as a power series our first step is

**A** Differentiate

**B** Integrate

**C** Partial fractions

**Section N4**
Level: Easy

To express $\dfrac{1}{(x+2)(x-2)}$ as a power series our first step is

**A** Integrate

**B** Partial Fractions

**C** Differentiate

**Section N4**
Level: Easy

Which of the following is not a power series?

**A** $\sum_{n=0}^{\infty} \frac{1}{n+1}(x-5)^n$

**B** $\sum_{n=0}^{\infty} \frac{1}{n}(x-5)^n$

**C** $\sum_{n=0}^{\infty} \frac{1}{n+1}(n-5)^n$

**D** x

**Section N4**
Level: Easy

To express $\ln(1+x)$ as a power series our first step is

**A** Partial fractions

**B** Integrate

**C** Differentiate

**Section N4**
Level: Easy

To express $\mathrm{atan}(x)$ as a power series our first step is

**A** Partial fractions

**B** Integrate

**C** Differentiate

**Section N4**
Level: Easy

To express $\int_0^x \frac{1}{t+1} dt$ as a power series our first step is

**A** Partial fractions

**B** Integrate

**C** Differentiate

**Section N4**
Level: Easy

To express $\dfrac{1}{(x+2)^2}$ as a power series our first step is

**A** Partial fractions

**B** Integrate

**C** Differentiate

**Section 11.8**
Level: Easy

If $f(x) = \sum_{n=0}^{\infty} c_n x^n$ what is $f(0)$

**A** $c_1 x$

**B** 0

**C** $c_0$

**Section 11.8**
Level: Easy

The Taylor series for f(x) centered at x=0 is $\sum_{n=0}^{\infty} \frac{f^(n)(0)x^n}{n!}$

**A** True

**B** False

**Section 11.8**
Level: Hard

If $f(x) = \frac{-1}{1-x}$ then $f^{(n)}(x) =$

**A** 0

**B** $\dfrac{(n)!}{(1-x)^{n+1}}$

**C** $\dfrac{1}{(1-x)^{n+1}}$

**Section 11.8**
Level: Hard

What is the coefficient of $x^2$ in the Taylor series for $\frac{1}{(1+x)^2}$ about a=0

**A** $\frac{1}{6}$

**B** $\frac{1}{3}$

**C** 1

**D** 3

**E** 6

**Section 11.8**
Level: Easy

A function f has the following Taylor series about $a = 0$

$$\frac{x^4}{2!}+\frac{x^5}{3!}+\frac{x^6}{4!}+\ldots+\frac{x^{n+3}}{(n+1)!}+\ldots$$

**A** $-3x\sin(x)+3x^2$

**B** $-\cos(x^2)+1$

**C** $-x^2\cos(x)+x^2$

**D** $e^{x^2}-x^2-1$

**E** $x^2e^x-x^3-x^2$

**Section 11.8**
Level: Hard

Let $3x^2 - 5x^3 + 7x^4 + 3x^5$ be the fifth-degree Taylor polynomial for the function f about a=0. What is the value of $f^{(5)}(0)$

**A** -30

**B** $3 \cdot 5!$

**C** $0$

**D** -5

**E** -15

**Section 11.8**
Level: Easy

The interval of convergence for $\sin(x)$ is

**A** $-1 < x < 1$

**B** $0 < x < 1$

**C** $-\infty < x < \infty$

**Section 11.8**
Level: Easy

The interval of convergence for $\dfrac{1}{1-x}$ is

**A** $-1 < x < 1$

**B** $0 < x < 1$

**C** $-\infty < x < \infty$

**Section 11.9**
Level: Easy

What is the power series for $\sin(3x)$

**A** $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n (3x)^n}{n!}$

**B** $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n (3x)^{2n+1}}{(2n+1)!}$

**C** $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n (3x)^{2n}}{(2n)!}$

**Section 11.9**
Level: Easy

What is the power series for $e^{x^2}$

**A** $\sum_{n=0}^{\infty} \frac{(x)^{2n}}{n!}$

**B** $\sum_{n=0}^{\infty} \frac{((x)^{2n+1}}{(2n+1)!}$

**C** $\sum_{n=0}^{\infty} \frac{(x)^{2n}}{(2n)!}$

**Section 11.9**
Level: Hard

What is the power series for $\sin(x) - x$

**A** $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n (x)^n}{n!}$

**B** $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n (x)^{2n+1}}{(2n+1)!}$

**C** $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n (x)^{2n}}{(2n)!}$

**Section 11.9**
Level: Easy

$\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n 2^{2n}}{(2n)!}$ is a power series for

**A** $e^2$

**B** $\sin(2)$

**C** $\cos(2)$

**Section 11.9**
Level: Easy

$\sum_{n=0}^{\infty} \frac{(-1)^n 2^n x^{2n}}{(n)!}$ is a power series for

**A** $e^{-2x^2}$

**B** $\sin(2x^2)$

**C** $\cos(2x^2)$

**Section 11.9**
Level: Easy

If $|f'(t)| < 1$, $|f''(t)| < 2$ and $|f'''(t)| < 3$ for t with $|t - 1| < 2$ give the bound on $|R_2(x)|$ on the interval $[-1, 3]$

**A** $2 \cdot \frac{2^3}{3!}$

**B** $1 \cdot \frac{2^3}{3!}$

**C** $3 \cdot \frac{2^3}{3!}$

**Section 11.9**
Level: Hard

Which function is larger for small x ($x < 1$) by looking at the first few terms of their Taylor Series

**A** $1 + \sin(x)$

**B** $e^x$

**Section 11.9**
Level: Hard

Which function is larger for small x ($x < 1$) by looking at the first few terms of their Taylor Series

**A** $\dfrac{1}{1-x}$

**B** $e^x$

**Section 11.10** Level: Easy

$(1+x)^m =$ where $m$ is not s positive integer.

**A** $1 + x^m$

**B** $1 + mx + \frac{m(m-1)x^2}{2!} + \frac{m(m-1)(m-2)x^3}{3!} + \ldots$

**Section 11.10** Level: Easy

To solve the differential equation $y' - y = x$ with $y(0) = 0$ we use a power series of the form $y = a_0 + a_1x + a_2x^2 + \ldots$. What is $a_0$?

**A** 0

**B** 1

**C** 2

**Section 11.10** Level: Easy

Which is the general solution to $y' + ay = b + cx$

**A** $\frac{b}{a} - \frac{c}{a^2} + \frac{cx}{a} + Ce^{-ax}$

**B** $(\frac{x^a(ab+b+acx)}{a(a+1)} + C)x^{-a}$

**C** $Ce^{-\frac{a}{b+1}x^{b+1}}$

**D** $C_1 \sin(x) + C_2 \cos(x) + (b - 2d) + cx + dx^2$

**E** $C_1 e^x + C_2 e^{-x}$

**Section 11.10** Level: Easy

Which is the general solution to $xy' + ay = b + cx$

**A** $\frac{b}{a} - \frac{c}{a^2} + \frac{cx}{a} + Ce^{-ax}$

**B** $(\frac{x^a(ab+b+acx)}{a(a+1)} + C)x^{-a}$

**C** $Ce^{-\frac{a}{b+1}x^{b+1}}$

**D** $C_1 \sin(x) + C_2 \cos(x) + (b - 2d) + cx + dx^2$

**E** $C_1 e^x + C_2 e^{-x}$

**Section 11.10** Level: Easy

Which is the general solution to $y' + ax^b y = 0$

**A** $\frac{b}{a} - \frac{c}{a^2} + \frac{cx}{a} + Ce^{-ax}$

**B** $(\frac{x^a(ab+b+acx)}{a(a+1)} + C)x^{-a}$

**C** $Ce^{-\frac{a}{b+1}x^{b+1}}$

**D** $C_1 \sin(x) + C_2 \cos(x) + (b - 2d) + cx + dx^2$

**E** $C_1 e^x + C_2 e^{-x}$

**Section 11.10** Level: Easy

Which is the general solution to $y'' + y = b + cx + dx^2$

**A** $\frac{b}{a} - \frac{c}{a^2} + \frac{cx}{a} + Ce^{-ax}$

**B** $(\frac{x^a(ab+b+acx)}{a(a+1)} + C)x^{-a}$

**C** $Ce^{-\frac{a}{b+1}x^{b+1}}$

**D** $C_1 \sin(x) + C_2 \cos(x) + (b - 2d) + cx + dx^2$

**E** $C_1 e^x + C_2 e^{-x}$

**Section 11.10** Level: Easy

Which is the general solution to $y'' - y = b + cx + dx^2$

**A** $\frac{b}{a} - \frac{c}{a^2} + \frac{cx}{a} + Ce^{-ax}$

**B** $(\frac{x^a(ab+b+acx)}{a(a+1)} + C)x^{-a}$

**C** $Ce^{-\frac{a}{b+1}x^{b+1}}$

**D** $C_1 \sin(x) + C_2 \cos(x) + (b - 2d) + cx + dx^2$

**E** $C_1 e^x + C_2 e^{-x}$

**Section 3.5**
Level: Easy

If $y = f(t)$ and $x = g(t)$ what is $\frac{dy}{dx}$

**A** $\frac{f'(t)}{g'(t)}$

**B** $\frac{g'(t)}{f'(t)}$

**C** $\frac{f''(t)}{g'(t)}$

**Section 3.5**
Level: Easy

Section36.eps Is a graph of which parametric equation?

**A** $x(t) = t$
$y = (t) = \sin(t)$

**B** $x(t) = \cos(t)$
$y = t$

**C** $x(t) = \sqrt{1 - t^2}$
$y(t) = \sqrt{1 - t^2}$

**D** $x(t) = \cos(t)$
$y(t) = \sin(t)$

**Section 6.3**
Level: Easy

The formula for the length of a parametric curve with $x = f(t)$, $y = g(t)$ is

**A** $\int_a^b \sqrt{1 + f'(t)}dt$

**B** $\int_a^b \sqrt{1 + (f'(t))^2}dt$

**C** $\int_a^b \sqrt{f'(t) + g'(t)}dt$

**Section 10.5**
Level: Easy

Which polar coordinate is the same as the rectangular coordinate $(3, 0)$

**A** $(3, 0)$

**B** $(3, \pi)$

**C** $(3, \pi/2)$

**Section 10.5**
Level: Easy

Which rectangular coordinate is the same as $(-3, \pi)$

**A** $(3, 0)$

**B** $(3, \pi)$

**C** $(3, \pi/2)$

**Section 10.5**
Level: Easy

Which cartesian equation is the same as $r = 4\csc(\theta)$

**A** $y = 4$

**B** $x = 4$

**C** $y = \frac{1}{4}$

**Section 10.5**
Level: Easy

Which polar equation is the same as $x^2 + y^2 = 2$

**A** $\sin(\theta) = 2$

**B** $csc(\theta) = 2$

**C** $r^2 = 2$

**Section 10.6**
Level: Hard

The points of intersection for $r = 1 + \cos(\theta)$ and $r = 1 - \cos(\theta)$

**A** $(1, 0)$, $(1, \pi)$

**B** $(1, \frac{\pi}{2})$, $(1, \frac{3\pi}{2})$

**C** $(0, 0)$

**Section 10.6**
Level: Hard

The points of intersection for $r = 1 + \sin(\theta)$ and $r = 1 - \sin(\theta)$

**A** $(1, 0)$, $(1, \pi)$, $(0, 0)$

**B** $(1, \frac{\pi}{2})$, $(1, \frac{3\pi}{2})$

**C** $(2, 0)$

**Section 10.6**
Level: Easy

Which describes the graph of the equation $r\sin(\theta) = 10$?

**A** Line

**B** Circle

**C** Spiral

**D** Rose

**Section 10.6**
Level: Easy

Which describes the graph of the equation $r = \theta$?

**A** Line

**B** Circle

**C** Spiral

**D** Rose

**Section 10.7**
Level: Easy

With $s\theta = \sin(\theta)$ and $c\theta = \cos(\theta)$, the arc length of $r = 4\cos(\theta)$ is

**A**

$$\int_0^{\pi/2} \sqrt{(-4s\theta)^2 + (4c\theta)^2} d\theta$$

**B**

$$2\int_0^{\pi/2} \sqrt{(-4s\theta)^2 + (4c\theta)^2} d$$

**C**

$$2\int_0^{\pi} \sqrt{(-4s\theta)^2 + (4c\theta)^2} d\theta$$

**D**

**Section 10.7**
Level: Easy

$\int_{\alpha}^{\beta} \sqrt{r^2 + (\frac{dr}{d\theta})^2} d\theta$ is the length of a polar curve from $\alpha$ to $\beta$

**A** True

**B** False

**Section 10.7**
Level: Easy

The formula for the area in one leaf of $r = \cos(2\theta)$ is Section107.eps

**A** $\displaystyle\int_{-\pi/2}^{\pi/2} \cos(2\theta)d\theta$

**B** $\displaystyle\int_{-\pi/3}^{\pi/3} \cos(2\theta)d\theta$

**C** $\displaystyle\int_{-\pi/4}^{\pi/4} \cos(2\theta)d\theta$

**D** $\displaystyle\int_{0}^{\pi} \cos(2\theta)d\theta$

**Section 10.7**
Level: Hard

Area shared by $r = 2$ and $r = 2(1 - c(\theta))$ is Section1072.eps

**A**

$$\int_0^{2\pi} \frac{1}{2}(2(1-c(\theta))^2 - 2^2 d\theta$$

**B**

$$2\int_{-\pi/2}^{\pi/2} \frac{1}{2}(2(1-c(\theta))^2 + 4\pi$$

**C**

$$2\int_{2\pi}^{\pi/2} \frac{1}{2}(2(1-c(\theta))^2 d\theta +$$

**Section A.5**
Level: Easy

Write $\frac{2+i}{1-i}$ in $a+bi$ form

**A** $2-1i$

**B** $\frac{(2+i)(1+i)}{(1-i)(1+i)} = \frac{1+3i}{2}$

**C** $\frac{2}{1-i} + \frac{i}{1-i}$

**Section A.5**
Level: Easy

Euler's formula says
$e^{i\theta} =$

**A** $\cos(\theta) + i\sin(\theta)$

**B** $\sin(\theta) + i\cos(\theta)$

**C** $e^{i}e^{\theta}$

**Section A.5**
Level: Easy

Which of the following is equal to $2e^{i\pi/3}$

**A** $\sqrt{3}+i$

**B** $1-\sqrt{3}i$

**C** $1+\sqrt{3}i$

**Section A.5**
Level: Easy

Which of the following is equal to $1 + i$

**A** $2e^{i\pi/3}$

**B** $\sqrt{2}e^{i\pi/4}$

**C** $e^{i\pi/4}$

**Section A.5**
Level: Easy

How many complex numbers are a solution to $x^{100} - 1 = 0$

**A** 1

**B** 2

**C** 50

**D** 99

**E** 100

**Section A.5**
Level: Easy

How many real solutions does $x^3 = 1$ have?

**A** 1

**B** 2

**C** 3

**Section 7.8**
Level: Easy

$$\cosh(x) =$$

**A** $\dfrac{e^x - e^{-x}}{2}$

**B** $\dfrac{e^x + e^{-x}}{2}$

**C** $\cos(x)$

**Section 7.8**
Level: Easy

$$\sinh(x) =$$

**A** $\dfrac{e^x - e^{-x}}{2}$

**B** $\dfrac{e^x + e^{-x}}{2}$

**C** $\sin(x)$