AP Calculus BC Summer Assignment

For students who have *completed* AP Calculus AB and are **entering** AP Calculus BC

Reviewing key concepts from AP Calculus AB is an excellent way to be fully prepared for the pace and rigor of AP Calculus BC. The following packet will help you practice and self-assess any concepts that you may want to spend extra time on before the start of school. You should start this review packet 2 weeks prior to the start of the school year. It has **two** parts. **You should not use any type of calculator while doing these problems.**

You should expect to submit this completed packet on the first day of school and plan to be assessed on these skills at the beginning of the school year. An answer key is provided; however, ensure your work is shown to receive full credit. In addition to this problem set, review your AP Calculus AB material. The College Board has a public practice exam from 2012 that you may look up and use for extra practice. If you would like additional resources to support your practice, we recommend Khan Academy as a great first step.

Revised 3/25/2025 FULL Name _____

Precalculus Name_____ ID: 1

BC Calc summer practice Part 1

Date_____ Period____

Determine if the sequence is arithmetic. If it is, find the common difference, the 52nd term, and the explicit formula.

1) −12, −3, 6, 15, ...

2) 37, 44, 51, 58, ...

Evaluate the related series of each sequence.

3) 29, 36, 43, 50

4) 25, 31, 37, 43, 49, 55, 61

Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.

5) −3, −6, −12, −24, ...

6) 3, 6, 12, 24, ...

Evaluate each geometric series described.

7) $4 + 8 + 16 + 32..., \ n = 6$

8) $-1 - 4 - 16 - 64..., \ n = 8$

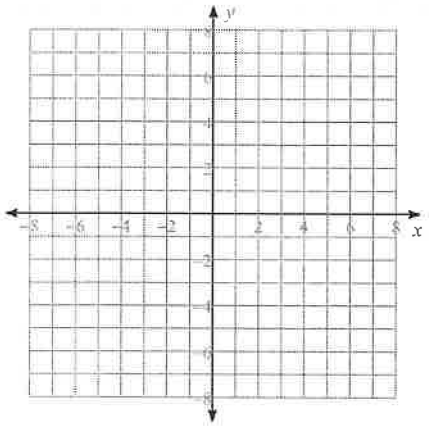
Rewrite each series using sigma notation.

9) 4 + 16 + 64 + 256

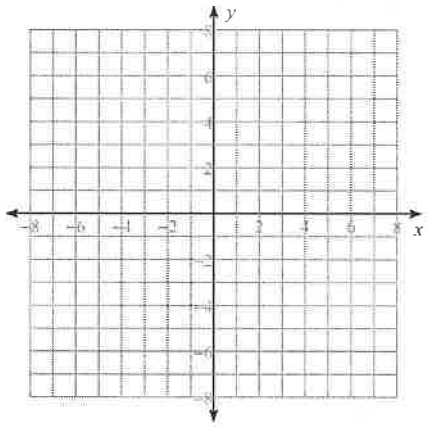
10) 5 + 25 + 125 + 625

Write each pair of parametric equations in rectangular form. Then sketch the curve.

11) $x = 4\sin t,\ y = 4\cos t$

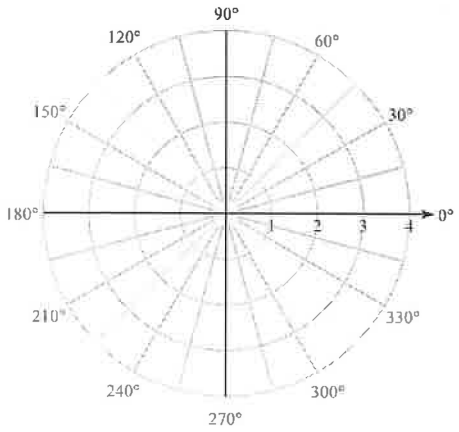


12) $x = t,\ y = -\frac{t^2}{4}$

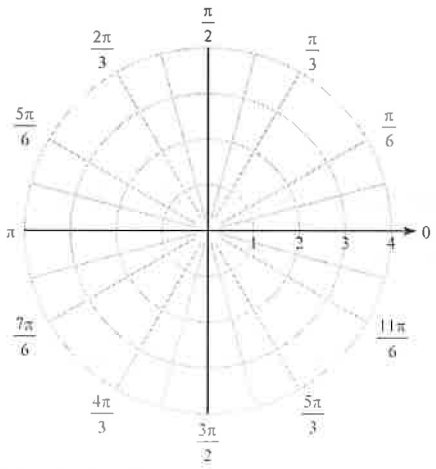


Plot the point with the given polar coordinates.

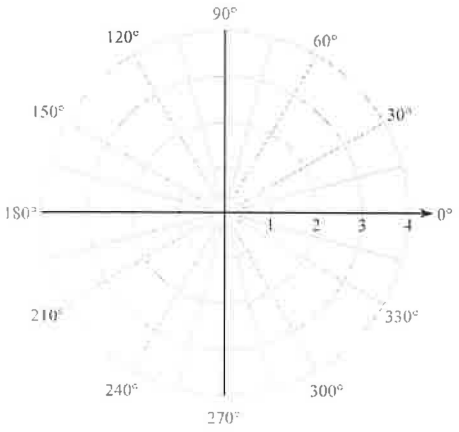
13) $(1, 75°)$



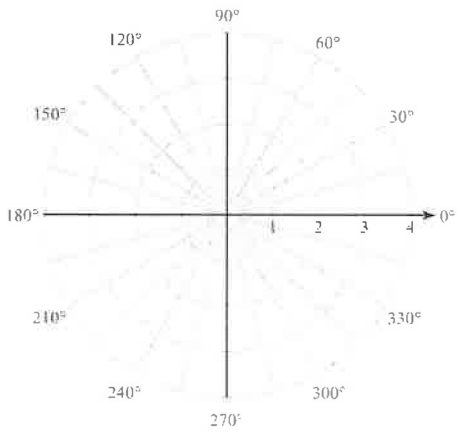
14) $\left(4, \frac{5\pi}{4}\right)$



15) $(2, 150°)$



16) $(2, 315°)$



Convert each equation from rectangular to polar form.

17) $(x+2)^2+(y+1)^2=5$

18) $x=\frac{y^2}{5}$

Answers to BC Calc summer practice (ID: 1) Part 1

1) Common Difference: $d = 9$
$a_{52} = 447$
Explicit: $a_n = -21 + 9n$

2) Common Difference: $d = 7$
$a_{52} = 394$
Explicit: $a_n = 30 + 7n$

3) 158

4) 301

5) Common Ratio: $r = 2$
$a_8 = -384$
Explicit: $a_n = -3 \cdot 2^{n-1}$

6) Common Ratio: $r = 2$
$a_8 = 384$
Explicit: $a_n = 3 \cdot 2^{n-1}$

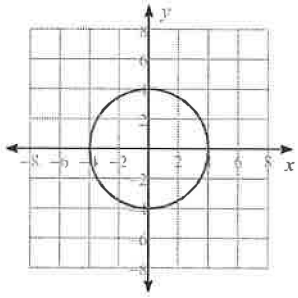
7) 252

8) −21845

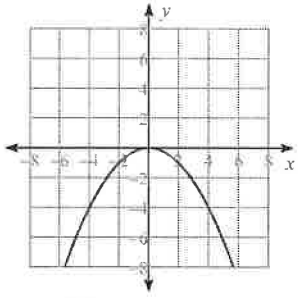
9) $\sum_{n=1}^{4} 4^n$

10) $\sum_{k=1}^{4} 5^k$

11) $\frac{x^2}{16} + \frac{y^2}{16} = 1$



12) $y = -\frac{x^2}{4}$



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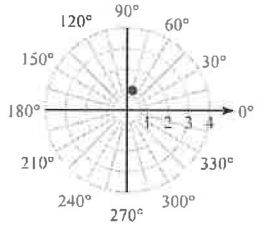

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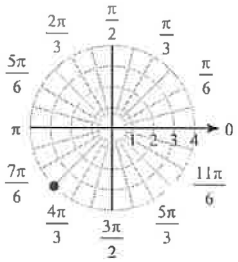

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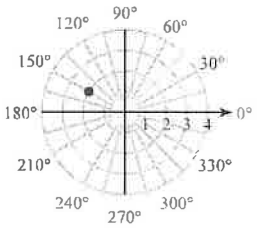

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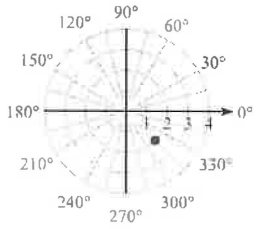

17) $r = -4\cos\theta - 2\sin\theta$

18) $r = 5\cot\theta\csc\theta$

AP Calculus BC Name_____ ID: 1

Summer Assignment Part 2

Date_____ Period____

Differentiate each function with respect to *x*.

1) $y = \left(2x^4 + 5\right)^{\frac{1}{5}}$

2) $y = \left(-x^3 + 4\right)^{-2}\left(5x^2 + 1\right)$

3) $y = \cos e^{2x^2}$

4) $y = e^{2x^3} \sin 3x^5$

5) $y = \dfrac{e^{x^3}}{\ln 5x^2}$

6) $y = \sec 4x^2 \cdot e^{2x^5}$

7) $y = \sin^{-1} x^2$

8) $y = \tan^{-1} 5x^5$

9) $f(x) = \csc 3x^2$

10) $y = \dfrac{2x^2 + 3}{\tan 3x^3}$

Evaluate each indefinite integral.

11) $\int \sec^2 x \, dx$

12) $\int -5\sec x \tan x \, dx$

13) $\int -\dfrac{3}{x^2} \, dx$

14) $\int -\dfrac{25\sqrt[3]{x^2}}{3} \, dx$

15) $\int 15x^4(x^5 - 5)^5 \, dx$

16) $\int \dfrac{3}{x(-4 + \ln 3x)^5} \, dx$

17) $\int 20x\sqrt[3]{5x^2 - 1}\, dx$

18) $\int \frac{6\sec^2 3x}{\tan^3 3x}\, dx$

19) $\int \left(e^{2x} + 2\right)^{\frac{4}{5}} \cdot 8e^{2x}\, dx$

20) $\int 2x(2x - 1)^4\, dx$

Answers to Summer Assignment Part 2 (ID: 1)

1) $\frac{dy}{dx} = \frac{1}{5}(2x^4 + 5)^{-\frac{4}{5}} \cdot 8x^3$

$= \frac{8x^3}{5(2x^4 + 5)^{\frac{4}{5}}}$

2) $\frac{dy}{dx} = (-x^3 + 4)^{-2} \cdot 10x + (5x^2 + 1) \cdot -2(-x^3 + 4)^{-3} \cdot -3x^2$

$= \frac{2x(10x^3 + 20 + 3x)}{(-x^3 + 4)^3}$

3) $\frac{dy}{dx} = -\sin e^{2x^2} \cdot e^{2x^2} \cdot 4x$

$= -4x \sin e^{2x^2} \cdot e^{2x^2}$

4) $\frac{dy}{dx} = e^{2x^3} \cdot \cos 3x^5 \cdot 15x^4 + \sin 3x^5 \cdot e^{2x^3} \cdot 6x^2$

$= 3x^2 e^{2x^3}(5x^2 \cos 3x^5 + 2\sin 3x^5)$

5) $\frac{dy}{dx} = \frac{\ln 5x^2 \cdot e^{x^3} \cdot 3x^2 - e^{x^3} \cdot \frac{1}{5x^2} \cdot 10x}{(\ln 5x^2)^2}$

$= \frac{e^{x^3}(3x^3 \ln 5x^2 - 2)}{x \cdot (\ln 5x^2)^2}$

6) $\frac{dy}{dx} = \sec 4x^2 \cdot e^{2x^5} \cdot 10x^4 + e^{2x^5} \cdot \sec 4x^2 \tan 4x^2 \cdot 8x$

$= 2x \sec 4x^2 \cdot e^{2x^5}(5x^3 + 4\tan 4x^2)$

7) $\frac{dy}{dx} = \frac{1}{\sqrt{1 - (x^2)^2}} \cdot 2x$

$= \frac{2x}{\sqrt{1 - x^4}}$

8) $\frac{dy}{dx} = \frac{1}{(5x^5)^2 + 1} \cdot 25x^4$

$= \frac{25x^4}{25x^{10} + 1}$

9) $f'(x) = -\csc 3x^2 \cot 3x^2 \cdot 6x$

$= -6x \csc 3x^2 \cot 3x^2$

10) $\frac{dy}{dx} = \frac{\tan 3x^3 \cdot 4x - (2x^2 + 3) \cdot \sec^2 3x^3 \cdot 9x^2}{\tan^2 3x^3}$

$= \frac{x(4\tan 3x^3 - 18x^3 \sec^2 3x^3 - 27x \sec^2 3x^3)}{\tan^2 3x^3}$

11) $\tan x + C$

12) $-5\sec x + C$

13) $\frac{3}{x} + C$

14) $-5x^{\frac{5}{3}} + C$

15) $\frac{1}{2}(x^5 - 5)^6 + C$

16) $-\frac{3}{4(-4 + \ln 3x)^4} + C$

17) $\frac{3}{2}(5x^2 - 1)^{\frac{4}{3}} + C$

18) $-\frac{1}{\tan^2 3x} + C$

19) $\frac{20}{9}(e^{2x} + 2)^{\frac{9}{5}} + C$

20) $\frac{1}{12}(2x - 1)^6 + \frac{1}{10}(2x - 1)^5 + C$