

Name Key DUE DATE: _____

Directions:

- Read each problem carefully and use your knowledge of mathematics to determine your answer.
- In order to receive FULL CREDIT you must either SHOW ALL WORK or EXPLAIN how you got your answer!! PLEASE NOTE: A multiple choice answer alone without any work will only receive half credit.

Question	Your Work/Explanation
<p>1) How is the series $1 - 2 + 4 + \dots + 64$ written in sigma notation?</p> <p>a) $\sum_{n=1}^{10} (-1)^n n^3$</p> <p>b) $\sum_{n=0}^8 (-1)^n n^3$</p> <p><u>c) $\sum_{n=1}^7 (-2)^{n-1}$</u></p> <p>d) $\sum_{n=1}^7 n^3$</p>	<p>a) $a_1 = (-1)^1 (1)^3 = -1 \times$</p> <p>b) $a_0 = (-1)^0 (0)^3 = 1$ $a_1 = (-1)^1 (1)^3 = -1 \times$</p> <p><u>c) $a_1 = (-2)^0 = 1$ $a_2 = (-2)^1 = -2 \checkmark$</u></p> <p>d) $a_1 = 1^3 = 1$ $a_2 = 2^3 = 8 \times$</p>
<p>2) An angle of $\frac{7\pi}{6}$ on the unit circle has coordinates of \leftarrow Q3</p> <p>a) $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$ <u>b) $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$</u></p> <p>c) $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ d) $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$</p>	<p>$\cos \frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$</p> <p>$\sin \frac{7\pi}{6} = -\frac{1}{2}$</p>
<p>3) The population of a bacterial culture doubled in eight hours. What was the exponential growth rate?</p>	<p>$A = A_0 e^{kt}$</p> <p>$2 = e^{8k}$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> $k = \frac{\ln 2}{8}$ </div>

4) Find the vertical asymptote(s):

$$f(x) = \frac{2x + 6}{x^2 - 9}$$

- a) $x = 3$
- b) $x = -2, x = -3, x = 3$
- c) $x = -3, x = 3$
- d) $y = 0, x = -2$

$$\frac{\cancel{2(x+3)}}{\cancel{(x+3)}(x-3)}$$

↑
 $x = 3$

5) What is t_1 for the geometric sequence for which $t_8 = -160$ and $t_3 = 5$?

- a) $-\frac{5}{4}$
- b) $\frac{5}{4}$
- c) 2
- d) -2

$$a_n = a_1 r^{n-1}$$

$$-160 = 5r^{(6-1)} \qquad 5 = a_1(-2)^{3-1}$$

$$-32 = r^5 \qquad 5 = 4a_1$$

$$r = -2 \qquad a_1 = 5/4$$

6) If $\cos 2\theta = \frac{\sqrt{3}}{2}$, where 2θ is an acute angle, which is the exact value of θ ?

- a) $\frac{\pi}{3}$
- b) $\frac{\pi}{2}$
- c) $\frac{\pi}{6}$
- d) $\frac{\pi}{12}$

$$\cos 2\theta = \frac{\sqrt{3}}{2}$$

$$2\theta = \frac{\pi}{6}, \frac{5\pi}{6}$$

$$\theta = \frac{\pi}{12}, \frac{5\pi}{12}$$

7) Solve for x : $32^{\frac{3}{4}-x} = 16^{5-3x}$

$$(2^5)^{3/4-x} = (2^4)^{5-3x}$$

$$\frac{15}{4} - 5x = 20 - 12x$$

$$\frac{1}{7} \cdot 7x = \frac{65}{4} \cdot \frac{1}{7}$$

$x = 65/28$

8) The value of the expression $e^{\frac{1}{2}\ln 16}$ is

- a) 4 b) 8 c) $\ln 4$ d) e^4

$$\begin{aligned} & e^{\frac{1}{2}\ln 16} \\ &= e^{\ln 16^{1/2}} \\ &= e^{\ln 4} \\ &= 4 \end{aligned}$$

9) Which of the following is equivalent to

$$\frac{\cos x - \cos^3 x}{\sin^3 x} ?$$

- a) $\cos x$ b) $\cos x - \cot^3 x$
 c) $\cot x$ d) $\cot^3 x$

$$\frac{\cos x \overset{\sin^2 x}{(1 - \cos^2 x)}}{\sin^3 x}$$

$$\frac{\cos x}{\sin x}$$

$$\cot x$$

10) The expression $6e^{x-\ln 2}$ is equivalent to

- a) $12e^x$
 b) $\frac{1}{2}e^x$
 c) $3e^x$
 d) $\frac{6e^x}{\ln 2}$

$$\frac{6e^x}{e^{\ln 2}} = \frac{6e^x}{2}$$

11) Find the partial fraction decomposition

for $\frac{x+2}{x^2-1} = \frac{A}{x+1} + \frac{B}{x-1}$

$$\frac{x+2}{(x+1)(x-1)} = \frac{A}{x+1} + \frac{B}{x-1}$$

$$x+2 = A(x-1) + B(x+1)$$

$$x=1 \quad 3 = 2B \\ B = 3/2$$

$$x=-1 \quad 1 = -2A \\ A = -1/2$$

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

12) Solve the following equation:

$$\log_2(x-3) + \log_2(x+1) = 5$$

$$\log_2(x-3)(x+1) = 5$$

$$32 = x^2 - 2x - 3$$

$$0 = x^2 - 2x - 35$$

$$(x-7)(x+5)$$

$$\boxed{x=7} \quad \cancel{x=-5}$$