

# Quiz #1-5 Key

Wednesday, October 22, 2008  
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Note: See bottom for clip of calculator work

Precalculus BC Quiz #1-5  
12.3A & 12.4

Name: Key Per: October 17, 2008

You MAY use calculators but you MUST include algebraic expressions with your answer. In short, COBRA everything.

1. Find the coefficient of  $x^3$  in  $(\sqrt{x}-3)^9$ .

$$x^3 = (\sqrt{x})^6$$

Need  $\binom{9}{6}(\sqrt{x})^6(-3)^3$  term

$$\binom{9}{6} \cdot (-3)^3 = -2268$$

2. Find the 20th partial sum of  $16+10+\frac{25}{4}+\frac{125}{32}+\dots$

$$a_n = 16 \cdot \left(\frac{5}{8}\right)^{n-1} \quad (\text{ratio} = \frac{5}{8})$$

$$\sum_{n=1}^{20} 16 \left(\frac{5}{8}\right)^{n-1} = 16 \left(\frac{1 - \left(\frac{5}{8}\right)^{20}}{1 - \frac{5}{8}}\right)$$

$$= \frac{384275379058402117}{9007199254740992}$$

3. Zach discovers a talent for Frisbee golf; he has a 90% chance of making a single shot. If he takes ten shots in a row, what is the probability he makes at least 9 of them? Answer to the nearest 0.01.

$$P(9 \text{ made}) = \binom{10}{9} (.9)^9 (.1)^1$$

$$P(10 \text{ made}) = .9^{10}$$

$$P(9 \text{ or } 10) = .736 \quad \text{or} \quad \boxed{74\%}$$

4. Consider  $\sum_{n=4}^{\infty} \frac{2^n}{7 \cdot 5^{2n-1}}$ .

a. Find the ratio  $a_{n+1}/a_n$

$$\frac{a_{n+1}}{a_n} = \frac{2^{n+1}}{7 \cdot 5^{2(n+1)-1}} = \frac{2^{n+1}}{7 \cdot 5^{2n+1}} \cdot \frac{7 \cdot 5^{2n-1}}{2^n} = \frac{2}{5^2} = \frac{4}{25}$$

b. Find the sum

$$a_4 = \frac{2^4}{7 \cdot 5^7}$$

$$\text{Sum} = \frac{a_4}{1 - \frac{4}{25}} = \frac{16}{459375}$$

5. Suppose  $\lim_{n \rightarrow \infty} a_n = 2$ . Compute

a.  $\lim_{n \rightarrow \infty} \frac{a_n + 1}{4}$

$a_n$  is getting closer to 2  
 $a_n + 1$  is getting closer to 3  
 $\frac{a_n + 1}{4}$  is getting closer to  $\boxed{\frac{3}{4}}$

b.  $\lim_{n \rightarrow \infty} \frac{1}{a_n}$

$$\frac{1}{a_n} \rightarrow \boxed{\frac{1}{2}}$$

Original Calc work

$nCr(9,6) \cdot (-3)^3$	-2268
$1 \cdot \left(\frac{5}{8}\right)^{20}$	$\frac{384275379058402117}{9007199254740992}$

$nCr(9,6) \cdot (-3)^3$	-2268
$16 \cdot \frac{1 - \left(\frac{5}{8}\right)^{20}}{1 - \frac{5}{8}}$	$\frac{384275379058402117}{9007199254740992}$
$nCr(10,9) \cdot (0.9)^9 \cdot 0.1 + (0.9)^{10}$	0.736099
$\frac{2^4}{7 \cdot 5^7}$	$\frac{16}{459375}$
$1 - \frac{4}{25}$	

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Checks:

Define $a(n) = \frac{2^n}{7 \cdot 5^{2 \cdot n - 1}}$	Done
$\frac{a(n+1)}{a(n)}$	$\frac{2}{25}$
$\sum_{n=4}^{\infty} (a(n))$	$\frac{16}{503125}$
$\sum_{n=1}^{20} \left( 16 \cdot \left(\frac{5}{8}\right)^{n-1} \right)$	$\frac{384275379058402117}{9007199254740992}$
expand $\left( \left( x^{\frac{1}{3}} - 3 \right)^9 \right)$	
$x^3 - 27x^{\frac{8}{3}} + 324x^{\frac{7}{3}} - 2268x^2 + 10206x^{\frac{5}{3}} - 30618x^{\frac{4}{3}} + 61236x - 78732x^{\frac{2}{3}} + 59049x^{\frac{1}{3}} - 19$	

#4  
#2  
#1

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