

Show all work. **Circle your answer.**

No books, no notes, no electronic devices at all.

Solutions will be posted shortly after the exam: www.math.wisc.edu/~miller/m217

Name_____

Hand in to your TA – Circle your DIScussion section (column one):

DIS 321	7:45 TR	901 Van Vleck	Forray, Susan Jane
DIS 322	8:50 TR	6224 Soc Sci	Bisgard, James William
DIS 324	9:55 TR	123 Ingraham	Bisgard, James William
DIS 326	11:00 TR	B235 Van Vleck	Leete, Jennifer A.
DIS 327	11:00 TR	113 Ingraham	Lu, Tianshi
DIS 328	12:05p TR	B235 Van Vleck	Leete, Jennifer A.
DIS 329	12:05p TR	6228 Soc Sci	Lu, Tianshi
DIS 330	1:20p TR	B321 Van Vleck	Forray, Susan Jane
DIS 332	2:25p TR	B135 Van Vleck	Hur, Youngmi
DIS 334	3:30p TR	B329 Van Vleck	Hur, Youngmi

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
Total	60	

1. (10 pts) Establish the formula

$$\sum_{k=1}^n 2k = 2 + 4 + \cdots + 2n = n + n^2$$

for every positive integer n , by showing

- (a) the formula is correct for $n = 1$, and
- (b) if true for n , the formula is also true for $n + 1$.

2. (10 pts) Find all θ which solve the equation:

$$2 \sin(\theta) \cos(\theta) - 2 \sin(\theta) - \cos(\theta) + 1 = 0$$

Circle your answer.

3. (10 pts) Find x if $\log_x(3x) = \frac{2}{3}$

Circle your answer.

4. (10 pts) Solve the logarithmic equation for x .

$$\ln(x) + \ln(x + 2) = \ln(3)$$

Circle your answer.

5. (10 pts) Find $\int t 2^{t^2} dt$.

Circle your answer.

6. (10 pts) Find the derivative of $y = 10^{\log_2(x)}$

Circle your answer.

Answers

1. See Exam 1 problem 4.

(a) $\sum_{k=1}^1 2k = 2 = 1^2 + 1$

(b) $\sum_{k=1}^{n+1} 2k = \sum_{k=1}^n 2k + 2(n+1) = n^2 + n + 2(n+1) = n^2 + 3n + 2$
and $(n+1)^2 + (n+1) = n^2 + 2n + 1 + n + 1 = n^2 + 3n + 2$ and so

$$\sum_{k=1}^{n+1} 2k = (n+1)^2 + (n+1)$$

2. See Exam 3 problem 3. $(2 \sin \theta - 1)(\cos \theta - 1) = 0$

$\theta = 2\pi n$ or

$\theta = \frac{\pi}{6} + 2\pi n$ or

$\theta = \frac{5\pi}{6} + 2\pi n$

for $n = 0, 1, -1, 2, -2, \dots$

3. $x = \frac{1}{27}$

4. $x = 1$

5. $\frac{1}{2 \ln(2)} 2^{t^2} + C$

6. $\frac{\log_2(10)}{x} 10^{\log_2(x)}$ or $\frac{\ln 10}{\ln 2} \frac{1}{x} e^{\frac{\ln 10}{\ln 2} (\ln x)}$