

Name:

Date:

Quiz 4

Precalculus - Hargus

Instructions: Please **show all work** (partial credit will be given for correct work, even if your answer is wrong).

1. (10 points) Simplify the expression to either 1 or -1.

a) $\sin(-x) \csc(-x)$

b) $-(\cos^2(x) + \sin^2(x))$

2. (10 points) Prove the identity.

a) $\sin(x) = \frac{\tan(x)}{\sec(x)}$

b) $\frac{\cos(x)}{1 - \cos^2(x)} = \cot(x) \csc(x)$

3. (10 points) Use a sum or difference identity to find the exact value of $\cos(15^\circ)$

$$\cos(15^\circ) = \underline{\hspace{2cm}}$$

4. (10 points) Find all solutions to the equation $\sin(2x) = \sin(x)$ in the interval $[0, 2\pi)$.

$$x = \underline{\hspace{2cm}}$$

5. (15 points) Find an **explicit** rule for the n th term of the sequence.

a) 1, 5, 9, 13, ...

$$a_n = \underline{\hspace{2cm}}$$

b) $-\frac{1}{2}$, 1, -2, 4, ...

$$a_n = \underline{\hspace{2cm}}$$

c) $a_1 = 5$, $a_n = a_{n+1} + 2$

$$a_n = \underline{\hspace{2cm}}$$

6. (15 points) You do not need to simplify your answers for these questions, answers with powers, products, and factorials are okay.

- a) How many ways are there make a license plate with any 3 digits (10 options) and then any 3 letters (26 options)? For instance, one license plate would be 357AYB.

Ways: _____

- b) How many ways are there to select a group of 3 students from a class of 9 students?

Ways: _____

- c) How many ways are there to rearrange the letters in the name JIMMY? (for instance, MYJIM is one way)

Ways: _____

- d) If we flip a coin 5 times, what is the probability that we get the sequence HTHHT in that order?

Probability: _____

- e) If we flip a coin 5 times, what is the probability that we get heads exactly 3 times if the order doesn't matter?

Probability: _____

7. (5 points) Compute the sum of the arithmetic series where $a_n = 4n + 2$ for the first 100 terms.
8. (12 points) True or false? (circle your answer)
- a) With two six-sided dice, the chance of rolling a 4 is the same as the chance of rolling a 6. **T or F**
- b) A term in an arithmetic sequence is the last term plus some constant. **T or F**
- c) The sequence 3, 7, 11, 15... converges. **T or F**
- d) The series $\sum_{k=1}^{\infty} (\frac{-3}{4})^k$ converges. **T or F**
9. (**Extra Credit:** 5 points) Prove the following statement for all positive integers n using induction.

$$8 + 10 + 12 + \dots + (2n + 6) = n^2 + 7n$$