

Name _____ date _____ raw scaled percent

Math 11 Trimester 3 Final Exam - PRACTICE (301 Points)

- Partial credit may be given for correct work. Therefore, it is to your advantage to write clear solutions.
- Answers must be completely simplified. No denominators may include radicals. All fractions simplified. All radicals simplified. Examples: write 9 instead of $\sqrt{81}$, $2\sqrt{3}$ instead of $\sqrt{12}$, and $\frac{3\sqrt{2}}{2}$ instead of $\frac{3}{\sqrt{2}}$.
- All angles you write for answers must be written positive. The positive horizontal axis is the zero angle and the positive rotation is counter clockwise. For example, write $\theta = \frac{3\pi}{2}$ rather than $\theta = -\frac{\pi}{2}$.
- Calculators are allowed, but only exact answers count. Approximate answers will be ignored. For example if the answer is $\sqrt{2}$ and you write 1.414213562373095, you will receive zero points for the answer.
- There are 21 questions and 120 minutes, so you have an average of about $5\frac{3}{4}$ minutes per question. Work efficiently, but do not rush.

■ The following questions count 15 points each.

[1] Solve for x if $\sqrt[4x]{16} \sqrt[3x]{16} \sqrt[6x]{16} = 8$.

[2] Solve for x if $3^x \cdot 9^{2x} - 27 = 0$.

[3] Solve for x if $3^{x^2+x-6} = 1$.

[4] Write $\log_5 125 = 3$ in exponential form.

[5] Solve for y if $\log_y 36 = -2$.

[6] Solve for x if $\log_2(x^2 + 3x + 4)^5 = 5$.

[7] Suppose that $f : f(x) = x^2$ for $x \in (0, \infty)$. Circle the letter of each statement that is true.

- a. f is a 1-1 function.
- b. f has an inverse function.
- c. The range of f is the set of all real numbers.
- d. f has an inverse function and the domain of its inverse function is \mathbb{R} .
- e. f is an increasing function of x .

Find the value of each expression in questions 8-11.

[8] $\cos \frac{-7\pi}{6}$

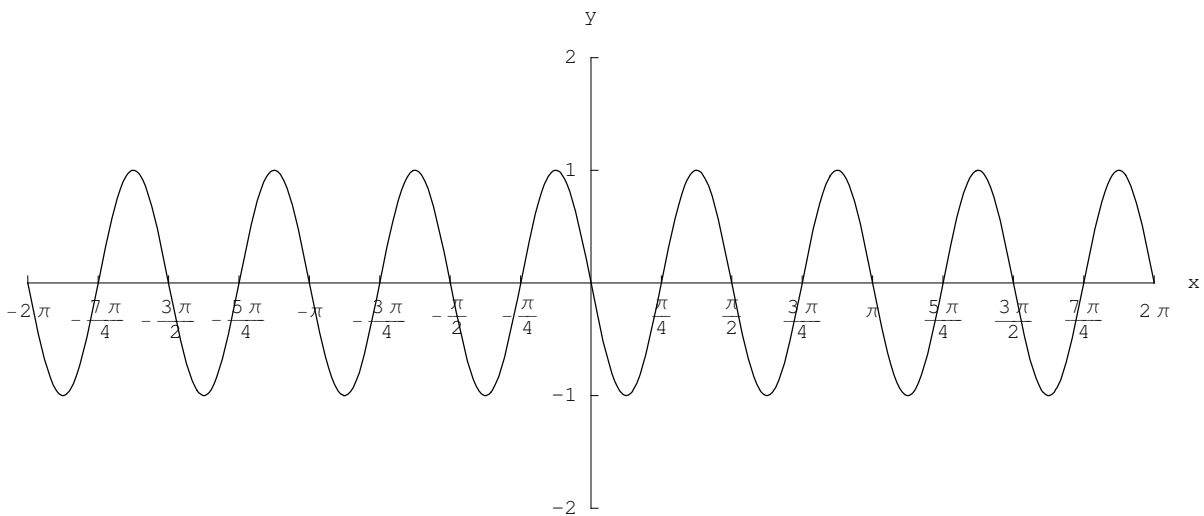
[9] $\sin \frac{11\pi}{6}$

$$[10] \quad \sec \frac{-4\pi}{3}$$

$$[11] \quad \cos \frac{5\pi}{12}$$

[12] Find all x , $0 \leq x \leq 2\pi$, for which $\cos x = \frac{-1}{2}$.

[13] Write the function using the general sine function. That is, in the form $y = A \sin k(x \pm \phi)$. This function crosses the x -axis at $\{\dots, -\frac{\pi}{2}, -\frac{\pi}{4}, 0, \frac{\pi}{4}, \frac{\pi}{2}, \dots\}$, and attains a maximum value of 1 and a minimum value of -1 .



[14] Find **all** values of x that make the following equation true: $\sin 3x = \sin 7x$.

[15] Find **all** values of x that make the following equation true: $\sin 2\theta = \cos 3\theta$.

[16] Write z where $z = -\sqrt{3} + i$ in polar form (also known as trigonometric form).

[17] Use de Moivre's theorem to compute $(1 + i)^6$, but write your final answer in rectangular form.

[18] Use mathematical induction to prove that $\sum_{i=1}^n i = \frac{n(n+1)}{2}$.

[19] A so called half-angle formula that is useful in elementary calculus is $\sin^2 x = \frac{1}{2} (1 - \cos 2x)$. Prove the identity $\sin^2 x = \frac{1}{2} (1 - \cos 2x)$. (Hint: write $\cos 2x$ as $\cos(x+x)$, then begin your proof with an addition formula.)

■ The following two questions count 8 points each.

[20] Write the fourth term of the expansion of $(x + 2)^6$.

[21] In a geometric sequence, each term is positive, the **third term is 18** and the **fifth term is 162**. Find the eighth term.