Homework: http://math.mnrt.net/

Name _____ raw _____ scaled _____ percent _____

Math 11

Final Exam - Practice

- **Partial credit may be given for correct work. Therefore, it is to your advantage to write clear solutions. If I cannot understand a solution within 90 seconds, then it will receive no partial credit.**
- **Answers must be completely simplified. No denominators may include radicals. All fractions reduced. Arithmetic must be completely performed; e.g. write 9 instead of $\sqrt{81}$ and $2\sqrt{3}$ instead of $\sqrt{12}$.**
- **Calculators are allowed, but all answers must be exact, unless question states otherwise.**

A. Evaluate the following. (13 points each)

[1] $\sqrt[4]{8}\ \sqrt[3]{4}\ \left(\sqrt[12]{2}\right)^7$

[2] $\dfrac{27^{\frac{2}{3}}}{81^{\frac{3}{4}}}$

[3] $\dfrac{\sqrt{17}}{\left(\sqrt[3]{13}\right)^0}$

B. Solve the following. (13 points each)

[1] $5^{2x+3} = 25^{x-1}$

[2] $2^x \cdot 8^3 = 16$

[3] $5^{x^2} \cdot 5^x - 5 = 20$

C. Perform the following. (10 points each)

[1] Write $3^4 = 81$ in logarithmic form.

[2] Write $\text{Log}_2\ 16 = 4$ in exponential form.

■ D. Solve the following. (9 points each)

[1] $\text{Log}_7\, 49 = y$

[2] If $\text{Log}_2\, 3 = 1.584$ and $y = \text{Log}_2\, 9$, then what does y equal?

[3] $\text{Log}_y\, 125 = 3$

■ E. Perform the following. (12 points each)

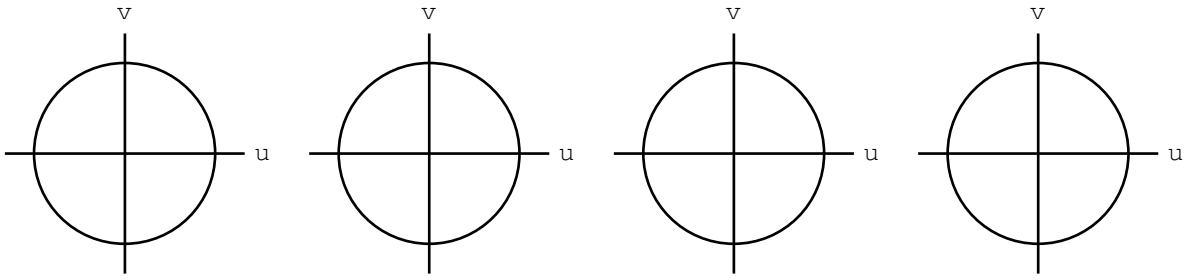
[1] Graph the function $y = \pi^x$. Show the exact coordinates of one point on the graph, and indicate the assymptotes (if any) of the function.

■ F. Answer the following. (6 points each)

[1] What is the domain of $f(x) = \frac{x^3+9x+14}{x^2+2x-15}$?

[2] Find functions f and g such that $f(g(x)) = \sqrt{3x+8}$

■ G. Find the following (circles provided for your conevnience). (13 points each)



[1] $\sin \frac{5\pi}{3}$

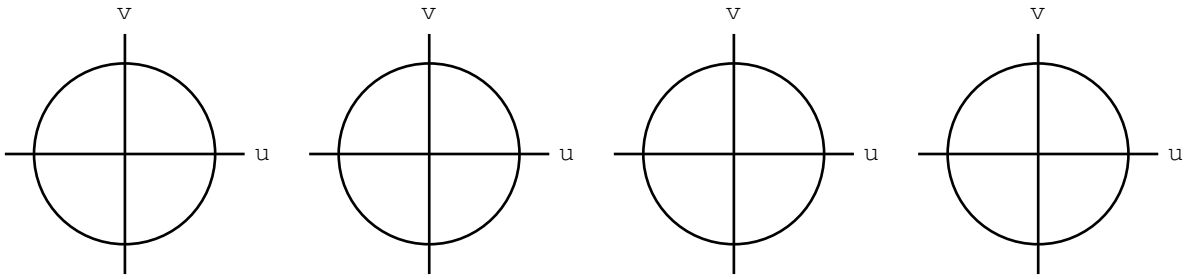
[2] $\cos \frac{2\pi}{3}$

[3] $\tan \frac{5\pi}{6}$

[4] $\sec \frac{5\pi}{4}$

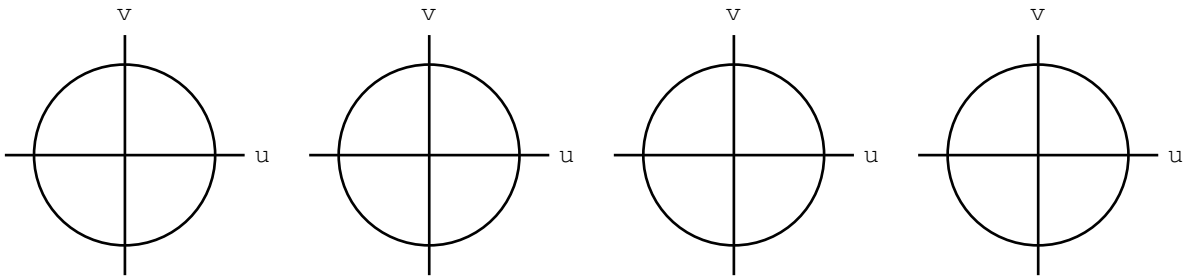
[5] $\cos \frac{5\pi}{12}$

■ H. Find the following. All angles measured from positive x-axis. (15 points each)



[1] All x such that $0 \le x \le 2\pi$ and $\sin x = \frac{\sqrt{3}}{2}$.

[2] All x such that $0 \le x \le 2\pi$ and $\cos x = -\frac{1}{2}$.

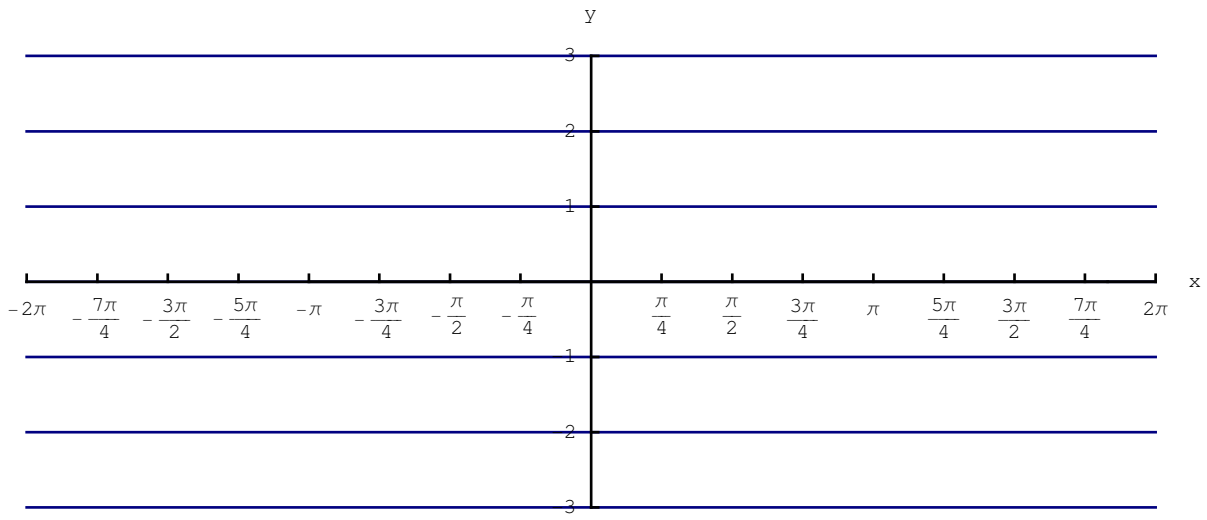


[3] All x such that $0 \le x \le 2\pi$ and $\tan x = \sqrt{3}$.

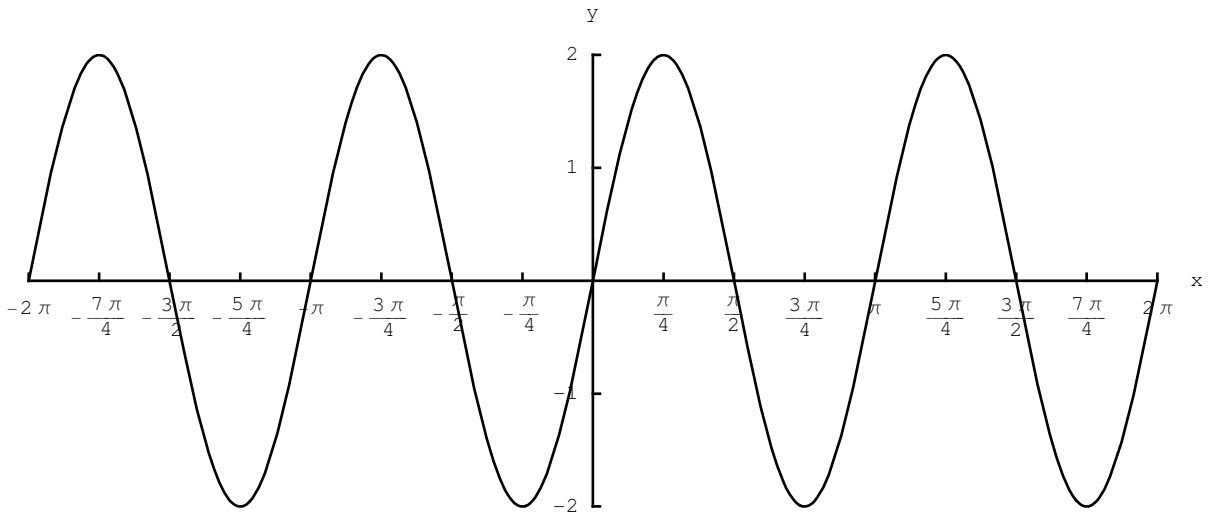
[4] All x such that $0 \le x \le 2\pi$ and $\cos x \le \frac{1}{2}$.

■ I. Answer the following. (20 points each)

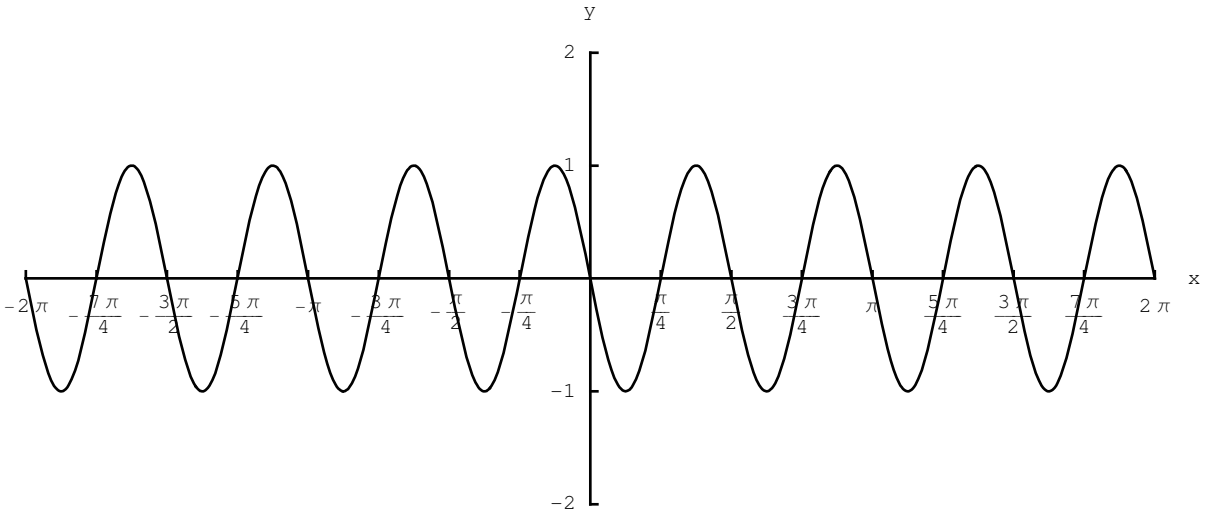
[1] Graph $y = \sec x$. Show at least one full period.



[2] Write the function using the general sine function. That is, in the form $y = A \sin k(x \pm \alpha)$. This function crosses the x-axis at $-2\pi, -\frac{3\pi}{2}, \frac{\pi}{2}, 0, \frac{\pi}{2}, \frac{3\pi}{2}, 2\pi$, and attains a maximum value of 2 and a minimum value of -2.



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



■ J. Solve the following. Find all solutions. (10 points each)

[1] $\sin 3x = \sin 7x$

[2] $\sin 2\theta = \cos 3\theta$

■ K. Answer the following. (10 points each)

[1] In an arithmetic sequence, the 5^{th} term is *22* and the 10^{th} term is *47*. Find the 16^{th} term.

[2] A geometric series has $t_2 = 6$, $t_5 = 48$. Find S_{10}, the sum of the first 10 terms.

■ L. Prove ONE of the following. (20 points)

[1] $\frac{\sin(x-y)}{\sin(x+y)} = \frac{\tan x - \tan y}{\tan x + \tan y}$

[2] $1 + \cos^2 x = \frac{\tan^2 x + 2}{\sec^2 x}$

■ M. Answer the following. (10 points each)

[1] Write $1 + i$ in polar form.

[2] Use de Moivre's theorem to compute $(1 + i)^6$.

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