**Trig Test #3 Concepts**

Graphing Trig F(n) Inverses
$\sin^{-1}(x)$, $\cos^{-1}(x)$, $\tan^{-1}(x)$

Domain & Range of Inverses
Review from last test & extend
Ex. $\sin^{-1}(-\sqrt{3}/2)$, $\cos(\sin^{-1} 3/5)$
$\sin^{-1}(\sin 5\pi/6)$

Fundamental Identities & Uses
Write expression using sine & cosine
Simplifying trig expressions
Verifying/Proving Identities

Addition & Subtraction formulas
Use in finding exact values
Proving Co-Function Identities
Proving/Verifying Identities
Solving Equations

Double & $1/2$ ∠ Formulas
Use is finding exact values
Proving/Verifying Identities
Solving Equations

Product ←→Sum Formulas
Use in rewriting
Use in solving equations

Trig Equations & Their Solutions
Tricks:
1) Algebra
like §7.4 #9/37 (Ed 5/Ed6)
2) Identities to rewrite
like §7.4 #14/52 (Ed 5/Ed6)
3) Factoring&Zero Factor Prop
like §7.4 #18/54 (Ed 5/Ed6)
4) Squaring & Identities
*Careful w/ squaring & check roots
like §7.4 #47/§7.5 37 (Ed 5/Ed6)
5) Dbl & 1/2 ∠ Formulas
like §7.4 #61/§7.5 39 (Ed 5/Ed6)

Polar Coordinates & Their Graphs
Different ways to write same coord.

Polar ←→ Rect. Coordinates
$x = r\cos\theta$, $y = r\sin\theta$
Substitute in r & θ and find value for x & y
$\tan\theta = y/x$, $r^2 = x^2 + y^2$
Substitute in x & y to find r
Substitute y & x & use knowledge of Δ's to find θ (or use inverse)

Polar ←→ Rect. Equations
Tricks:
1) Direct Substitution
Like§8.1 #42/44 (Ed 5/Ed 6)
2) Trig identities to simplify
Like §8.1#46/48 (Ed 5/Ed 6)
3) Multiply by r
Like §8.1#50/56 (Ed 5/Ed 6)
4) Square sides
Like §8.1#59 (Ed 6)
5) More complex trig formulas
Like §8.1#60/68 (Ed 5/Ed 6)
Like §8.2#49/55 (Ed 5/Ed 6)

Graphs of Polar Equations
(Multiple Choice)
Think about equation & pix produced
Sine vs. Cosine & Symmetry produced
Circles $r = a$
(center at zero)
$r = 2a\sin\theta$
(center at $|a|$, $(a, \pi/2)$ )
$r = 2a\cos\theta$
(center at (a, 0) )
Spiral $r = a\theta$
Straight Lines thru Origin $\theta = a$
Cardioids $r = a(1 \pm \cos\theta)$
$r = a(1 \pm \sin\theta)$
Roses n-leaved n is odd
2n-leaved n is even
} $r = a\sin n\theta$ or $r = a\cos n\theta$
Limacon $r = a \pm b\cos\theta$
$r = a \pm b\sin\theta$
If a < b then there is a loop
If a = b then it is a Cardioid
If a > b then dimpled
Lemniscates $r^2 = a^2\sin 2\theta$
symmetric about y = x
$r^2 = a^2\cos 2\theta$
symmetric about the x-axis

Symmetry of Polar Graphs
- About the Polar Axis
  - Test: $\theta$ vs $-\theta$ yield same r
- About $\theta = {}^{\pi}/_{2}$
  - Test: $\theta$ vs $\pi - \theta$ yield same r
- About the Pole
  - Test: $\theta$ vs $\pi + \theta$ yield same r
    - Or rare instances r vs $-r$

Complex #'s Graphed
- Real Axis & Imaginary Axis
- Graphing Sets of Complex #'s

Complex #'s Absolute Value (Modulus)
$| z | = \sqrt{a^2 + b^2}$

Trig Form of a Complex #
1) Graph complex to help find $\theta$
2) Modulus called r
3) $\tan \theta = b/a$ & use trig $\Delta$ knowledge for finding $\theta$ in most cases
4) $z = r (\cos \theta + i \sin \theta)$

Multiplying & Dividing Complex #'s Using Trig Form
- Multiply:
  - Multiply moduli
  - Add arguments (the $\theta$'s)
- Divide:
  - Divide moduli
  - Subtract arguments (the $\theta$'s)

DeMoivre's Theorem
- What For: Raising trig form of a complex # to the $n^{th}$ power
- How:
  - Modulus to $n^{th}$ power
  - "n" times argument (the $\theta$)

Roots of Complex #'s (in Trig Form)
1) There are $k = 0, 1, 2, \ldots, n - 1$ roots
2) Raise modulus to ${}^{1}/_{n}$ power
3) For successive roots the argument changes as $\frac{\theta + 2k\pi}{n}$
4) Graphing all "k" roots

Solving an Equation w/ Complex #'s
- Applies $n^{th}$ root

**To STUDY, review your homework!!**