MT-A141 Precalculus Worksheet 7.3

Group: ______________ Present: ____

1. Solve $\cos(x) = -0.7$. Period of cosine is: _______

   Find all solutions in the interval $[0, 2\pi)$ (within 0.01): ____________________

   Thus the complete set of solutions is: __________________________________

2. Solve the equation $\sin(\theta) = \tan(\theta)$ algebraically. First write $\tan(\theta)$ as ___________

   So solve $\sin(\theta) =$ ___________

   (Tempted to cancel next? Don't! You'll often "lose" solutions by canceling — when the canceled term is equal to zero)

   Rewrite as: $\sin(\theta) -$ _______ $= 0$.

   Next factor: ___________________________ $= 0$.

   Thus either ______________ $= 0$ or ____________________ $= 0$,

   that is, either ______________ $= 0$ or ______________ $=$ ______________.

   Therefore $\theta =$ _______ $+$ _______ or $\theta =$ _______ $+$ _______.

3. Solve $2\cos(\alpha) + \tan(\alpha) = \sec(\alpha)$ algebraically. Period $=$ _______.

   (Graph first to see the number of solutions in one period)

   Convert equation to sines and cosines: __________________________________

   Clear denominators:____

   Convert to only sines or cosines, using $\sin^2(\alpha) + \cos^2(\alpha) = 1$:

   _________________________________, that is, ___________________________

   Factor the quadratic: ____

   Thus either ____________________ $= 0$ or ____________________ $= 0$,

   that is, either ______________ $=$ ___________ or ______________ $=$ ___________.

   Hence $\alpha =$ ____.

   Check $\tan(\alpha)$ and $\sec(\alpha)$ for each α to see if we need to reject any of these values.

   Reject ____________________ because __________________________________.

   Final solution: $\alpha =$ ____.

4. Solve $2\cos^2(x) = \cot(x)$ graphically. Period $=$ _______.

   $Y_1 =$ ____________________ (and $Y_2 =$ ____________________).

   $x =$ ____.

5. Solve $\sec(2x)\csc(2x) = 2\csc(2x)$. Period = ________.

   Graphically: $x =$ ____.

   Algebraically: Bring all terms to one side:

   ____ $= 0$.

   Factor: ____ $= 0$.

   Thus either ________________________ $= 0$ or ________________________ $= 0$,

   that is, either ________________ = _____________ or ________________ = _____________.

   Hence $2x =$ ____,

   and so $x =$ ____.

6. Solve $2\cos^3(t) + \cos^2(t) - 2\cos(t) - 1 = 0$ algebraically.

   Factor (first stage): $\cos^2(t)$(_____________________) − (_____________________) $= 0$

   Factor (second stage): (________________________)(________________________) $= 0$

   Factor (third stage): (__________________)(__________________)(__________________) $= 0$

   Hence ________________ $= 0$ or ________________ $= 0$ or ________________ $= 0$,

   so $\cos(t) =$ ________ or $\cos(t) =$ ________ or $\cos(t) =$ ________.

   Hence $t =$ ____.

   Now graph $y = 2\cos^3(t) + \cos^2(t) - 2\cos(t) - 1$ and hence solve the inequality $2\cos^3(t) + \cos^2(t) - 2\cos(t) - 1 > 0$ for $t \in [0, 2\pi]$.

   $t \in$ ____.

7. Suppose that the temperature in degrees Fahrenheit at time t hours after midnight (at a certain time of the year) is modeled by the function $f(t) = 12\cos(\frac{\pi}{12}t - \frac{5\pi}{4}) + 60$.

   Graph $y = f(t)$ in the window $[0, 24, 1] \times [40, 80, 5]$.

   Solve both graphically and algebraically: for what hours of the day is the temperature at least 63°F?