1. The value of \( \tan \left( \frac{13\pi}{4} \right) \) will be easier to assess if the angle \( \frac{13\pi}{4} \) radians is related to a more familiar angle within the principal circle. \( 0 \leq \theta < 2\pi \). Since \( 2\pi < \frac{13\pi}{4} < 4\pi \), we can subtract \( 2\pi \) from this angle to find that it is equivalent to \( \frac{13\pi}{4} - 2\pi = \frac{13\pi - 8\pi}{4} = \frac{5\pi}{4} \), which is in the principal circle. So \( \tan \left( \frac{13\pi}{4} \right) = \tan \left( \frac{5\pi}{4} \right) = 1 \). 

2. For a circle of radius \( R \), the length of the circular arc subtended by an angle \( \theta \) (in radians) is \( s = R\theta \). Since \( 60^\circ = \frac{\pi}{3} \) radians, the length of the arc in this problem is 
\[ s = (2 \text{ feet}) \left( \frac{\pi}{3} \right) = \frac{2\pi}{3} \text{ feet}. \]
We can also find the result in this equivalent way. The circumference of the circle is \( C = 2\pi R \)
\[ = 2\pi (2 \text{ feet}) = 4\pi \text{ feet}. \] Sixty degrees is \( \frac{\pi}{6} \) of the way around the circle, so the length of that circular arc is \( s = \frac{\pi}{6} C = \frac{\pi}{6} \cdot 4\pi \) feet = \( \frac{2\pi}{3} \) feet.

3. This problem is just an exercise in recognizing the equation for a particular sort of curve. Ellipses have an equation in the standard form
\[ \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1. \]

4. If two sides of a triangle and the angle between are known, we have the necessary information to find the remaining side by using the Law of Cosines. (The Pythagorean Theorem requires the included angle to be a right angle only. The Law of Sines and the Triangle Area Formula would need us to supply further information about the triangle in order to be useful.)

5. The sum of an infinite geometric series with first term \( a \) and ratio between successive terms \( r \) is 
\[ S = \frac{a}{1-r}, \] provided \( |r| < 1 \). We can see that for our series, 
\[ \sum_{k=1}^{\infty} 8 \cdot \left( \frac{1}{3} \right)^{k+1}, \] that \( r = \frac{1}{3} \); however, we must be careful—the first term is not \( 8 \). If we use \( k=1 \) in the general term given, we find that \( a = 8 \cdot \left( \frac{1}{3} \right)^2 = 8 \cdot \frac{1}{9} = \frac{8}{9} \). So the sum for this series is 
\[ S = \frac{\frac{8}{9}}{1 - \frac{1}{3}} = \frac{\frac{8}{9}}{\frac{2}{3}} = \frac{8}{9} \cdot \frac{3}{2} = \frac{4}{3}. \]
The important detail to be clear about here is that the airplane, upon reaching Sarasota, changes its direction of flight by 50°. The itinerary and the straight line between Fort Meyers and Orlando then trace out a triangle with two known sides and an included angle of \(180°-50° = 130°\). We can use the Law of Cosines to find the straight-line distance then:

\[
S^2 = 150^2 + 100^2 - 2 \cdot 150 \cdot 100 \cdot \cos 130° = 51,784 \text{ mi}^2
\]

\[
\Rightarrow S \approx 227.56 \text{ miles.}
\]

We can eliminate choice (c) immediately because it gives the equation for an ellipse. We next notice that the vertices of the hyperbola lie at \((0,1)\) and \((6,1)\); the center of the hyperbola is at the midpoint of a segment connecting them, so it lies at \((\frac{0+6}{2}, 1) = (3, 1) = (h, k)\). Since the standard form of the equation for a hyperbola is \(\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1\), the correct choice must be either (b) or (c).

The remaining piece of information is that one of the asymptotes of the hyperbola has the equation \(3y + 2x - 9 = 0\). If we rewrite this to represent a line passing through the center of the hyperbola \((3, 1)\), we get

\[
3y + 2x - 9 = 0 \Rightarrow 3y = -2x + 9 \Rightarrow y = -\frac{2}{3}x + 3.
\]

re-writing the \(y\)- and \(x\)-terms

\[
(y-1) + 1 = -\frac{2}{3} (x-3) + 3
\]

\[
(y-1) + 1 = -\frac{2}{3} (x-3) - 2 + 3
\]

\[
(y-1) + 1 = -\frac{2}{3} (x-3) + 1
\]

\[
(y-1) = -\frac{2}{3} (x-3) \text{. point-slope form}
\]

The pair of asymptotes have slopes of \(\pm \frac{2}{3}\) and cross at the center of the hyperbola, \((3, 1)\). From the diagram above, we see then that the major axis of the hyperbola is horizontal with \(a = 3\) and the minor axis is vertical with \(b = 2\). So the equation for this hyperbola is

\[
\frac{(x-3)^2}{3^2} - \frac{(y-1)^2}{2^2} = \frac{(x-3)^2}{9} - \frac{(y-1)^2}{4} = 1.
\]
(8) To evaluate this expression, we don’t actually need to know what angle has a tangent value of $\frac{3}{4}$; we only need to know what a right triangle containing this angle looks like. If $\theta = \tan^{-1}\left(\frac{3}{4}\right)$, it is the case that $\tan \theta = \frac{3}{4}$. We can construct a right triangle, as shown at right, built upon such an angle. Our expression is $\cos(\tan^{-1}\left(\frac{3}{4}\right)) = \cos \theta$, for which we can see that $\cos \theta = \frac{4}{5}$.

(9) Let us look through this expression $3i + 3i^3 - \frac{3+2i}{1-i}$ term-by-term. The first term is already in simplest form. As for the next term, $3i^3 = 3i \cdot i \cdot i = 3(1 \cdot i \cdot i) = 3(-1) \cdot i = -3i$. So, in fact, the first two terms cancel. What remains is a ratio, for which we may rationalize the denominator to find

$$\frac{-3 + 2i}{1-i} \cdot \frac{1+i}{1+i} = \frac{-3 + 3i + 2i + 2i^2}{1 - i + i - i^2} = \frac{-3 + 2(-1) + 5i}{1 - (-1)}$$

$$= \frac{-1 + 5i}{2} = -\frac{1}{2} - \frac{5}{2}i$$

(10) We can work our way down the list of choices:

A) $\sin \theta = \sin(-\theta) = 0 \Rightarrow \sin \theta = \sin(-\theta)$; but sine is an odd function, meaning $\sin(-\theta) = -\sin \theta$. So this choice is rejected.

B) $\sin^{-1}(\sin \theta) = \theta$ for all $\theta$; but for an inverse function $f^{-1}(x)$, $f^{-1}(f(x)) = x$ for all $x$ only if the range of $f^{-1}(x)$ is the same as the domain of $f(x)$; the domain of $\sin \theta$ is any real angle $\theta$, but the range of $\sin^{-1} x$ is only $[-\frac{\pi}{2}, \frac{\pi}{2}]$; so $\sin^{-1}(\sin \theta)$ does not always give back $\theta$.

Example: $\sin\left(\frac{5\pi}{4}\right) = -\frac{\sqrt{2}}{2}$, but $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) = -\frac{\pi}{4}$. We also reject this choice.

C) For $0 \leq \theta < 2\pi$, $\sin \theta = \frac{1}{2} \Rightarrow \theta = \frac{\pi}{6}, \frac{5\pi}{6}$, so there is more than one solution. So we reject this choice.

D) Since the range of the cosine function is $[-1, 1]$, it is true that the equation $\cos \theta = -2$ has no solution. Thus, only this choice is true.

(11) The problem simply asks that we recognize that if a particular complex number $a + bi$ is a zero of a polynomial with real coefficients, its complex conjugate $a - bi$ is also a zero of said polynomial. So if a real polynomial has a zero of $1 - i$, then $1 + i$ is also a zero. Since complex zeros come in pairs for a real polynomial, a third-degree polynomial with two complex zeros must have a third real zero. Only the polynomial $(x-1)(x-[1-i])(x-[1+i]) = (x-1)(x-1+i)(x-1-i)$ satisfies these requirements.
(12) The complex number $8i$ can be expressed as $8 \left( \cos \frac{\pi}{2} + i \sin \frac{\pi}{2} \right)$. DeMoivre's Theorem for roots tells us that the cube roots of a complex number $r \left( \cos \Theta + i \sin \Theta \right)$ are given by

$$r^{1/3} \left[ \cos \left( \frac{\Theta + 2\pi k}{3} \right) + i \sin \left( \frac{\Theta + 2\pi k}{3} \right) \right], \quad k = 0, 1, 2.$$

For $8i$, $r = 8$, $\Theta = \frac{\pi}{2}$, and the three complex cube roots are

$$8^{1/3} \left[ \cos \left( \frac{\pi/2 + 0}{3} \right) + i \sin \left( \frac{\pi/2 + 0}{3} \right) \right]$$

$$= 2 \left[ \cos \left( \frac{\pi}{6} \right) + i \sin \left( \frac{\pi}{6} \right) \right] = \left( \frac{\sqrt{3}}{2} + i \cdot \frac{1}{2} \right) = \sqrt{3} + i,$$

$$2 \left[ \cos \left( \frac{\pi/2 + 2\pi}{3} \right) + i \sin \left( \frac{\pi/2 + 2\pi}{3} \right) \right]$$

$$= 2 \left[ \cos \left( \frac{5\pi}{6} \right) + i \sin \left( \frac{5\pi}{6} \right) \right] = \left( -\frac{\sqrt{3}}{2} + i \cdot \frac{1}{2} \right) = -\sqrt{3} + i,$$

and

$$2 \left[ \cos \left( \frac{\pi/2 + 4\pi}{3} \right) + i \sin \left( \frac{\pi/2 + 4\pi}{3} \right) \right]$$

$$= 2 \left[ \cos \left( \frac{3\pi}{6} \right) + i \sin \left( \frac{3\pi}{6} \right) \right] = 2 \left[ \cos \left( \frac{3\pi}{2} \right) + i \sin \left( \frac{3\pi}{2} \right) \right]$$

$$= 2 (0 - i) = -2i.$$

The first of these roots appears on the list of choices. \( \Box \)

(13) We should first factor the argument of the sine function completely in order to see the important quantities properly. So we have

$$f(x) = 2 \sin \left( \frac{3\pi}{2} x - \frac{1}{3} \right) = 2 \sin \left[ \frac{3\pi}{2} \left( x - \frac{2}{9\pi} \right) \right],$$

where the amplitude is $A = 2$. We can read the argument as telling us that the basic function $\sin x$ is to be first shifted to the right by $\frac{2}{9\pi}$ units (the phase shift) and then compressed horizontally by a factor of $\frac{3\pi}{2}$, changing the period to $T = \frac{2\pi}{\left( \frac{3\pi}{2} \right)} = 2\pi \cdot \frac{2}{3\pi} = \frac{4}{3}$. A graph of $f(x)$ is presented in the answer key.
(14) A trigonometric equation of the form \(a \sin \theta + b \cos \theta = c\) can be solved by transforming it to look like the “angle-addition” formula \(\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta\). We will associate \(a\) and \(b\) with an “auxiliary angle” \(\beta\). If we divide the original equation through by \(\sqrt{a^2+b^2}\), we obtain \(\sin \theta \cdot \frac{a}{\sqrt{a^2+b^2}} + \cos \theta \cdot \frac{b}{\sqrt{a^2+b^2}} = \frac{c}{\sqrt{a^2+b^2}}\).

If we now call \(\cos \beta = \frac{a}{\sqrt{a^2+b^2}}\) and \(\sin \beta = \frac{b}{\sqrt{a^2+b^2}}\) (where we can see that \(\cos^2 \beta + \sin^2 \beta = 1\)), then the equation we want to solve now looks like \(\sin(\theta + \beta) = \frac{c}{\sqrt{a^2+b^2}}\); if it is the case that \(-1 \leq \frac{c}{\sqrt{a^2+b^2}} \leq 1\), we can then find a solution.

For our problem, we can write \(1 \cdot \sin \theta + 1 \cdot \cos \theta = 1\), so \(a = b = c = 1\).

The equation can thus be transformed into \(\sin(\theta + \beta) = \frac{1}{\sqrt{1+1^2}}\), with \(\cos \beta = \sin \beta = \frac{1}{\sqrt{2}}\Rightarrow \beta = \frac{\pi}{4}\) and the transformed equation is

\[
\sin(\theta + \frac{\pi}{4}) = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \Rightarrow \text{either } \theta + \frac{\pi}{4} = \frac{\pi}{4} \Rightarrow \theta = 0 \text{ or } \theta + \frac{\pi}{4} = \frac{3\pi}{4} \Rightarrow \theta = \frac{\pi}{2}.
\]

Check:

\[
\sin 0 + \cos 0 = 1 + 1 = 2 \checkmark
\]
\[
\sin \frac{\pi}{2} + \cos \frac{\pi}{2} = 1 + 0 = 1
\]

(15) For an arithmetic sequence with first term \(a\) and difference between successive terms \(d\), the \(n\)th term is \(a + (n-1) \cdot d\) and the sum of the \(n\) terms is \(S = n \cdot [a + \frac{(n-1)}{2} \cdot d]\).

We can see that \(a = 5\) and \(d = 4\), but we also need to know the number, \(n\), of terms in the sequence. The last term is 205, so \(205 = a + (n-1) \cdot d = 5 + (n-1) \cdot 4 \Rightarrow (n-1) = \frac{205 - 5}{4} = 50 \Rightarrow n = 51\). We last find that the sum of the sequence is

\[
S = n \cdot [a + \frac{(n-1)}{2} \cdot d] = 51 \cdot [5 + \frac{(51-1)}{2} \cdot 4] = 51(5+100) = 5355
\]
(16) The search for zeroes of a polynomial can be aided by the use of Descartes' Rule of Signs and the Rational Zeros Theorem. For our polynomial,

\[ f(x) = x^3 + x^2 - 2 \quad , \quad f(-x) = (-x)^3 + (-x)^2 - 2 = -x^3 + x^2 - 2 \]

there is only one sign change for \( f(x) \), so the Rule of Signs tells us that \( f(x) \) has one positive real root, while \( f(-x) \), having two sign changes, tells us that there are either two or no negative real roots. The Rational Zeros Theorem states that the magnitudes of rational zero candidates are given by factors of the constant term of the polynomial divided by factors of the polynomial's leading coefficient. For our function, the candidates are \( \pm \frac{1}{1}, \pm \frac{2}{1} \); it is found immediately that \( f(1) = 1^3 + 1^2 - 2 = 0 \), so \( x = 1 \) is the positive real root indicated by the Rule of Signs.

If we now divide \( f(x) \) by the linear term \( x - 1 \), we obtain

\[
\frac{x^3 + x^2 - 2}{x^3 - x^2} = \frac{2x^2 + 2x + 2}{2x^2 - 2x} = \frac{2x^2 - 2x}{2x - 2} = \frac{2}{2} = 1
\]

The quotient polynomial \( x^2 + 2x + 2 \) has a negative discriminant \( (b^2 - 4ac = 2^2 - 4 \cdot 1 \cdot 2 = 4 - 8 < 0) \), so the remaining zeroes of \( f(x) \) are complex [note that the Rule of Signs suggested that there might be no negative real roots].

We use the quadratic formula to find

\[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-2 \pm \sqrt{4 - 4 \cdot 2}}{2} = -1 \pm i
\]

for the other two zeroes of \( f(x) \).

(17) The given inequalities indicate that the points in the solution set for the system require:

\[ x^2 + y^2 \leq 4 \quad - \text{they must be inside or on a circle of radius 2 centered on the origin} \]

\[ y - x^2 + 2 > 0 \quad \Rightarrow y > x^2 - 2 \quad - \text{they must be above or on the parabola described} \]

and \( y \leq 1 \quad - \text{they must be below or on the line} \ y = 1 \).

A graph of the solution region is shown in the answer key.
(18) The elimination method for a system of linear equations involves the removal of one variable at a time by adding or subtracting multiples of the equations from one another.

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Subtract \(2x\) (row 1):
  \[
  - (2x + 4y - 2z = 6) \Rightarrow -x + y - 2z = 0
  \]
- Add \(1x\) (row 1):
  \[
  \Rightarrow \begin{align*}
  x + 2y - z &= 3 \\
  2y + z &= 7 \\
  y - 2z &= 0
  \end{align*}
  \]

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Divide row 3 by 3 and exchange rows 2 and 3.

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Multiply row 2 by 2:
  \[
  \Rightarrow \begin{align*}
  2x - 4y + z &= 14 \\
  -2x + 4y - 2z &= 6
  \end{align*}
  \]

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Subtract \(2x\) (row 2):
  \[
  \Rightarrow \begin{align*}
  x + 2y - z &= 3 \\
  4y - 7 &= 7 \\
  y &= 2
  \end{align*}
  \]

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Multiply row 3 by 1:
  \[
  \Rightarrow \begin{align*}
  x + 2y - z &= 3 \\
  2y - 2z &= 6 \\
  y &= 2
  \end{align*}
  \]

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Add \(z = 1\):
  \[
  \Rightarrow \begin{align*}
  x + 2y - z &= 3 \\
  2y &= 4 \\
  y &= 2
  \end{align*}
  \]

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Subtract \(2x\) (row 3):
  \[
  \Rightarrow \begin{align*}
  x &= 0 \\
  y &= 2 \\
  z &= 1
  \end{align*}
  \]

\[
\begin{align*}
&x + 2y - z = 3 \\
&2x - 4y + z = 7 \\
&-2x + 4y - 2z = 6
\end{align*}
\]

- Check:
  \[
  \begin{align*}
  &0 + 2(0) - 1 = 4 - 1 = 3 \\
  &2(2) - 4(2) + 1 = -8 + 1 = -7 \checkmark \\
  &-0 + 2 - 2(1) = 2 - 2 = 0
  \end{align*}
  \]

(19) The given equation \(9x^2 + 4y^2 - 36x - 8y + 4 = 0\) (there is a "typo" in the exam problem) can be converted to standard form for a conic section by completing the squares:

\[
\begin{align*}
9x^2 - 36x + 4y^2 - 8y + 4 &= 0 \\
\Rightarrow 9(x^2 - 4x + 4) + 4(y^2 - 2y + 1) &= -4 + 9 \\
\Rightarrow 9(x - 2)^2 + 4(y - 1)^2 &= 36 \\
\Rightarrow \frac{(x - 2)^2}{4} + \frac{(y - 1)^2}{9} &= 1.
\end{align*}
\]

We see from this equation that the center of the ellipse lies at \((2,1)\), that the semi-major axis is \(a = 3\) \(\Rightarrow a = 3\) and is parallel to the \(y\)-axis, and that the semi-minor axis is \(b = 4\) \(\Rightarrow b = 2\). The ellipse's vertices that lie above and below the center, at \((2, 1 + 3) = (2,4)\) and \((2, 1 - 3) = (2,-2)\).

The focal distance of this ellipse is given by \(c^2 = a^2 - b^2 = 9 - 4 = 5 \Rightarrow c = \sqrt{5}\), so the foci lie above and below the center at \((2, 1 + \sqrt{5})\) and \((2, 1 - \sqrt{5})\).

A graph of the ellipse is presented in the answer key.
(20) For an angle $\theta$ with $\sin \theta = \frac{3}{5}$ in the second quadrant (since $\cos \theta < 0$), we can construct the diagram shown at right; the missing side of the right triangle is given by $3^2 + x^2 = 5^2$
\[ \Rightarrow x^2 = 25 - 9 = 16 \Rightarrow x = -4. \]

The remaining trigonometric ratios are then
$\cos \theta = \frac{-4}{5}$, $\tan \theta = \frac{3}{-4}$, $\cot \theta = \frac{-4}{3}$,
$\sec \theta = \frac{5}{-4}$, $\csc \theta = \frac{5}{3}$.

(21) Since two of the three sides of this triangle are unknown, but all three angles are known, we are able to make use of the Law of Sines:
$\frac{\sin \alpha}{a} = \frac{\sin \beta}{b} = \frac{\sin \gamma}{c} \rightarrow \frac{\sin 105^\circ}{6} = \frac{\sin 45^\circ}{b} = \frac{\sin 30^\circ}{c}$
\[ \Rightarrow b = 6 \cdot \frac{\sin 45^\circ}{\sin 105^\circ} \quad \text{and} \quad c = 6 \cdot \frac{\sin 30^\circ}{\sin 105^\circ}. \]

It will be useful to have an exact value for $\sin 105^\circ$. We can use, for instance, the fact that $\sin \theta = \sin (180^\circ - \theta)$, so $\sin 105^\circ = \sin 75^\circ$. We then bring in the "half-angle" formula for sine, $\sin \left(\frac{\theta}{2}\right) = \pm \sqrt{\frac{1 - \cos \theta}{2}}$ to find that
$\sin 75^\circ = \sin \left(\frac{150^\circ}{2}\right) = \pm \sqrt{\frac{1 - \cos 150^\circ}{2}} = \pm \sqrt{\frac{1 - (-\sqrt{3}/2)}{2}} = \pm \sqrt{\frac{1 + \sqrt{3}}{2}}$
$75^\circ$ is in first quadrant

$\Rightarrow \sin 105^\circ = \sqrt{\frac{2 + \sqrt{3}}{4}} = \sqrt{\frac{2 + \sqrt{3}}{2}} = \sin 75^\circ$

The unknown sides of the triangle are then $b = 6 \cdot \frac{\sin 45^\circ}{\sin 105^\circ} = 6 \cdot \frac{\sqrt{2}}{\sqrt{2 + \sqrt{3}}}$
$= 6 \cdot \sqrt{\frac{2}{2 + \sqrt{3}}} = 6 \cdot \sqrt{\frac{2}{2 + \sqrt{3}} \cdot \frac{2 - \sqrt{3}}{2 - \sqrt{3}}} = 6 \cdot \sqrt{\frac{4 - 2\sqrt{3}}{4}} = 6 \sqrt{\frac{4 - 2\sqrt{3}}{4 - 3}} = 6 \sqrt{\frac{4 - 2\sqrt{3}}{3}} \approx 4.39$
and $c = 6 \cdot \frac{\sin 30^\circ}{\sin 105^\circ} = 6 \cdot \frac{\frac{1}{2}}{\sqrt{2 + \sqrt{3}}} = 6 \cdot \frac{1}{\sqrt{2 + \sqrt{3}}} = 6 \sqrt{2 + \sqrt{3}} \approx 3.11$.

The altitude of our triangle is $h = b \sin 30^\circ = c \sin 45^\circ = 6 \cdot \frac{\sin 30^\circ \ sin 45^\circ}{\sin 105^\circ}$
$= 6 \cdot \frac{\left(\frac{1}{2}\right) \left(\frac{\sqrt{2}}{2}\right)}{\sqrt{2 + \sqrt{3}}} = 6 \cdot \frac{\sqrt{2}}{2 \sqrt{2 + \sqrt{3}}} = 3 \sqrt{4 - 2\sqrt{3}} \approx 2.20$. Finally, this gives us the area of the triangle as $A = \frac{1}{2} \text{(base)} \times \text{(height)} = \frac{1}{2} \cdot 6 \cdot h$
$= 3 \cdot 3 \sqrt{4 - 2\sqrt{3}} = 9 \cdot \sqrt{4 - 2\sqrt{3}} \approx 6.59$. 

G. Ruffa -- February 2006