31A

1) (+5) + (-8) = -3

2) (-6) + (+3) + (-4) = -7

3) direction and magnitude

4) $H^2 = 6^2 + 8^2$

$H^2 = 36 + 64$

$H^2 = 100$

$H = 10$

5) $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{5}{13} = .3846$

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{12}{13} = .9231$

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{5}{12} = .4167$

6) $\sin\theta = .3846$

$\theta = 22.6°$

7) $H^2 = 5^2 + 10^2$

$H^2 = 25 + 100$

$H^2 = 125$

$H = \sqrt{125} \approx 11.18$ miles

$\tan\theta = \frac{10}{5} = 2$

$\theta \approx 63.4°$

11 miles, 63.4°

8) $H^2 = 100^2 + 40^2$

$H^2 = 10{,}000 + 1{,}600$

$H^2 = 11{,}600$

$H \approx 107.7$ miles

$\tan\theta = \frac{40}{100} = .4$

$\theta \approx 21.8°$

107.7 miles, 21.8°

(You could have used sin or cos and gotten the same answer, as long as you set the ratio up correctly.)

31B

1) $\sin = \frac{\text{opposite}}{\text{hypotenuse}}$

$\cos = \frac{\text{adjacent}}{\text{hypotenuse}}$

$\tan = \frac{\text{opposite}}{\text{adjacent}}$

2) direction and magnitude

3) resultant

4) $H^2 = 3^2 + 11^2$

$H^2 = 9 + 121$

$H^2 = 130$

$H = \sqrt{130} \approx 11.40$ miles

5) $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{11}{11.4} \approx .9649$

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{3}{11.4} \approx .2632$

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{11}{3} \approx 3.6667$

6) $\tan\theta = 3.6667$

$\theta \approx 74.7°$

7) $H^2 = 100^2 + 10^2$

$H^2 = 10{,}000 + 100$

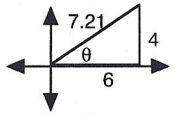
$H^2 = 10{,}100$

$H = \sqrt{10{,}100} \approx 100.50$ miles

$\tan\theta = \frac{10}{100} = .1$

$\theta° \approx 5.7°$ 180 - 5.7 = 174.3°

8) (+4) + (+2) = +6 on the X axis
(+3) + (+1) = +4 on the Y axis



9) $H^2 = 6^2 + 4^2 = 36 + 16 = 52$

$H = \sqrt{52} \approx 7.21$

$\tan\theta = \frac{4}{6} = .6667$

$\theta \approx 33.7°$

31C

1) $H^2 = 30^2 + 40^2$

$H^2 = 900 + 1600 = 2500$

$H = \sqrt{2500} = 50$

$\tan\theta = \frac{40}{30} = 1.3333$

$\theta \approx 53.1°$

50 miles, 53.1°

2) (+8) + (-5) = +3 on the X axis
(+2) + (+3) = +5 on the Y axis

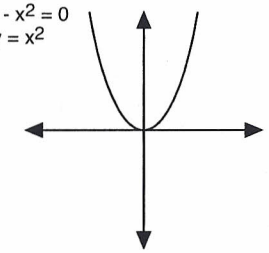
$H^2 = 3^2 + 5^2 = 9 + 25 = 34$

$H = \sqrt{34} \approx 5.83$

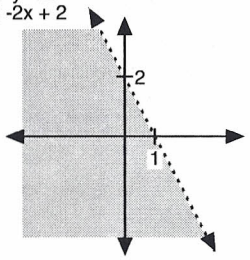
$\tan\theta = \frac{5}{3} = 1.666$

$\theta = 59.0°$

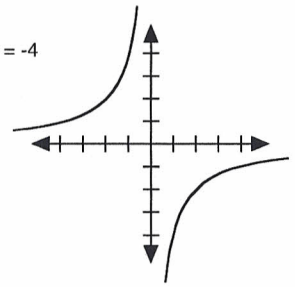
3) $y - x^2 = 0$
$y = x^2$



4) $2x + y < 2$
$y < -2x + 2$



5) $xy = -4$



6) $m = \frac{-5-(-2)}{-3-1} = \frac{-3}{-4} = \frac{3}{4}$

7) $2\sqrt{-24} + 3\sqrt{8} =$

$2\sqrt{4\cdot6\cdot(-1)} + 3\sqrt{4\cdot2} =$

$2\cdot2\cdot i\sqrt{6} + 3\cdot2\sqrt{2} =$

$4i\sqrt{6} + 6\sqrt{2}$

8) $X^2 - 16X + 64 =$

$(X-8)(X-8) = (X-8)^2$

9) $\frac{X^2 - \frac{2}{X}}{X - \frac{3}{X}} = \frac{\frac{X^3-2}{X}}{\frac{X^2-3}{X}} =$

$\frac{X^3-2}{X} \times \frac{X}{X^2-3} = \frac{X^3-2}{X^2-3}$

10) $X^2 - 2X - 7 = 0$

$X = \frac{2 \pm \sqrt{4 - 4(1)(-7)}}{2(1)}$

$X = \frac{2 \pm \sqrt{32}}{2}$

$X = \frac{2 \pm 4\sqrt{2}}{2} = 1 \pm 2\sqrt{2}$

31D

1) $H^2 = 75^2 + 125^2$

$H^2 = 5625 + 15625 = 21250$

$H = \sqrt{21250} \approx 145.77$ miles

$\tan\theta = \frac{125}{75} = 1.6667$

$\theta \approx 59.0°$

2) (-4) + (-1) = -5 on the X axis
(+2) + (6) = +8 on the Y axis

$H^2 = 5^2 + 8^2 = 25 + 64$

$H^2 = 89$

$H = \sqrt{89} \approx 9.43$

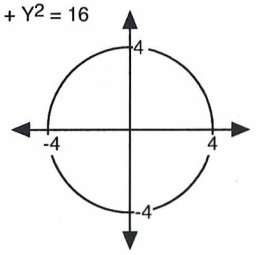
$\tan\alpha = \frac{8}{5} = 1.6$

$\alpha = 57.99°$

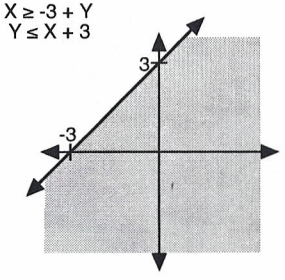
$\theta = 180° - 57.99° = 122.0°$

(+5 is used instead of -5 because distance or length is always positive. There will be more on this in PreCalculus.)

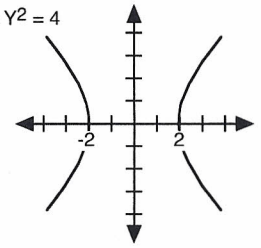
3) $X^2 + Y^2 = 16$



4) $X \geq -3 + Y$
$Y \leq X + 3$



5) $X^2 - Y^2 = 4$



6) $m = \frac{1}{2}$

$(4) = \frac{1}{2}(3) + b$

$4 = 1\frac{1}{2} + b$

$b = 2\frac{1}{2}$

$y = \frac{1}{2}x + 2\frac{1}{2}$

7) $\frac{2\sqrt{12}}{\sqrt{10}} \div \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{6}}{\sqrt{5}}$

$\frac{2\sqrt{6}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{30}}{5}$

8) $6X^2 - X - 2 =$
$(3X - 2)(2X + 1)$

9) $\frac{\frac{1}{X} - 2}{\frac{4}{X}} = \frac{\frac{1-2X}{X}}{\frac{4}{X}} = \frac{1-2X}{X} \times \frac{X}{4} = \frac{1-2X}{4}$

10) $2X^2 - 3X = 2$

$2X^2 - 3X - 2 = 0$

$(2X+1)(X-2) = 0$

$X = -\frac{1}{2}, 2$

31E

1) $H^2 = 15^2 + 30^2 = 225 + 900$

$H^2 = 1125$

$H = \sqrt{1125} \approx 33.54$ feet

$\tan\theta = \frac{30}{15} = 2$

$\theta \approx 63.4°$

33.54 ft.
63.4°

2) (-8) + (+2) = -6 on the X axis
(+6) + (-3) = +3 on the Y axis

$H^2 = 6^2 + 3^2 = 36 + 9 = 45$

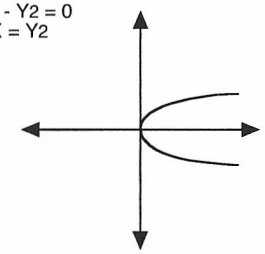
$H = \sqrt{45} \approx 6.71$

$\tan\alpha = \frac{3}{6} = .5$

$\alpha \approx 26.6°$

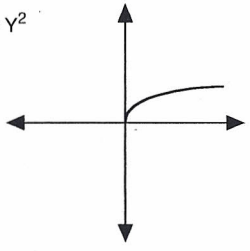
$\theta = 180° - 26.6° = 153.4°$

3) $X - Y2 = 0$
$X = Y2$



4) $\sqrt{X} = Y$

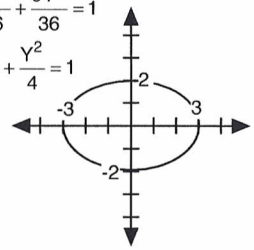
$X = Y^2$



5) $4X2 + 9Y2 = 36$

$\frac{4X^2}{36} + \frac{9Y^2}{36} = 1$

$\frac{X^2}{9} + \frac{Y^2}{4} = 1$



6) $d = \sqrt{(6-(-2))^2 + (-3-1)^2} =$
$\sqrt{64+16} = \sqrt{80} \approx 8.9$

7) $\frac{4}{\sqrt{3}} + \frac{6\sqrt{2}}{\sqrt{5}} = \frac{4\sqrt{3}}{3} + \frac{6\sqrt{10}}{5} =$
$\frac{20\sqrt{3} + 18\sqrt{10}}{15}$

8) $10X2 + 23X + 12 =$
$(5X + 4)(2X + 3)$

9) $3B^{-2}A^3C - \frac{2C}{B^2A^{-3}} + \frac{7CB^2}{A^{-3}} =$

$\frac{3A^3C}{B^2} - \frac{2A^3C}{B^2} + 7A^3B^2C =$

$\frac{A^3C}{B^2} + 7A^3B^2C$

10) $X^2 + X + 1 = 0$

$X = \frac{-1 \pm \sqrt{1 - 4(1)(1)}}{2(1)} =$

$\frac{-1 \pm \sqrt{-3}}{2} = \frac{-1 \pm i\sqrt{3}}{2}$