Integrated Math 3
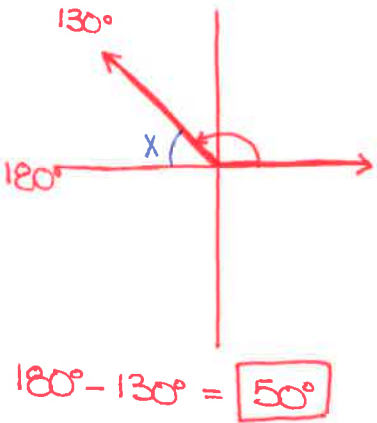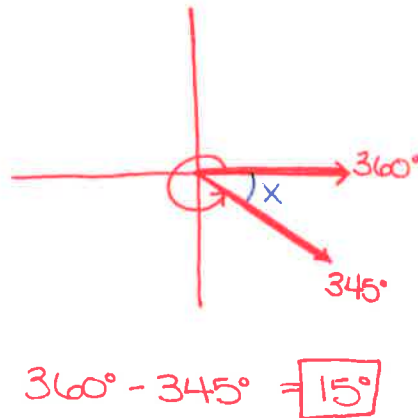Unit 4: Trig. Representations and Modeling
4.9

Objective: To find the six trigonometric functions through any given point and find the angle.

Warm Up: Sketch the angle in standard position and find the measure of the reference angle for each angle below.
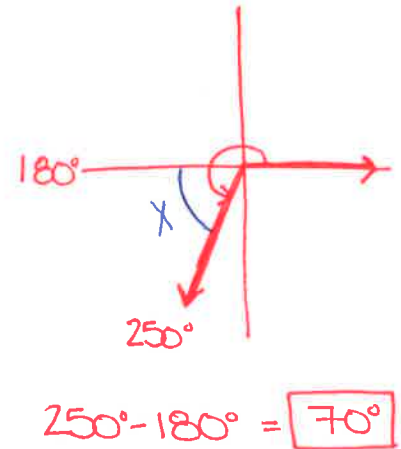
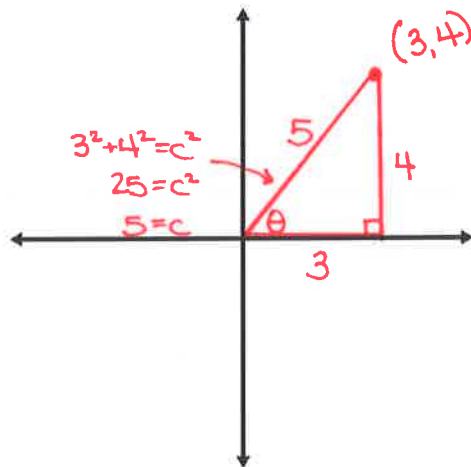   a. 130°   b. 345°   c. 250°

$180° - 130° = \boxed{50°}$

$360° - 345° = \boxed{15°}$

$250° - 180° = \boxed{70°}$

Example: Let P be a point on the terminal side of θ. Draw a picture and find the three trig functions of θ.

A.) $(3, 4)$

$\sin\theta = \dfrac{4}{5}$

$\cos\theta = \dfrac{3}{5}$

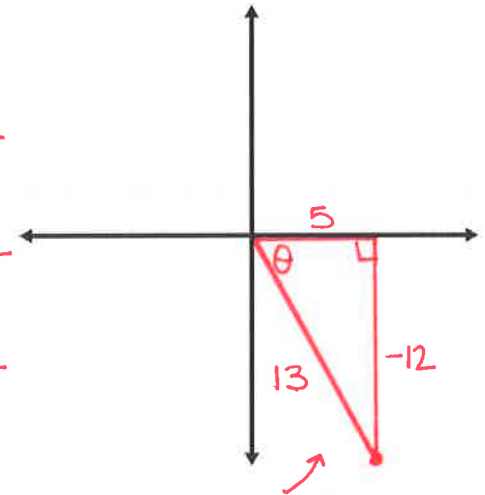$\tan\theta = \dfrac{4}{3}$

$3^2 + 4^2 = c^2$
$25 = c^2$
$5 = c$

$(3, 4)$

B.) $(5, -12)$

$\sin\theta = \dfrac{-12}{13}$

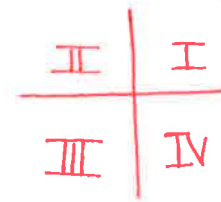$\cos\theta = \dfrac{5}{13}$

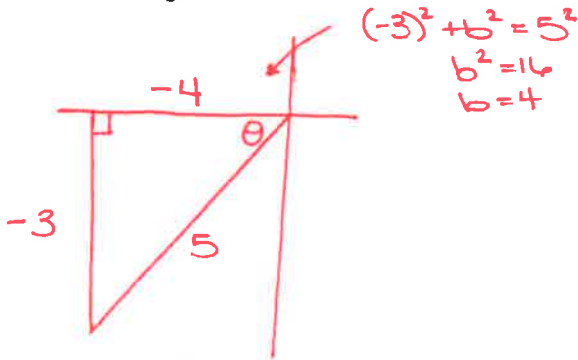$\tan\theta = \dfrac{-12}{5}$

$5^2 + (-12)^2 = c^2$
$169 = c^2$
$13 = c$

Example: Find the exact value of the three trig functions of an angle θ, in standard position, given the following information: *hypotenuse is always positive!

A.) $\sin\theta = -\frac{3}{5}$; terminal side of angle θ lies in quadrant III

$$II \mid I$$
$$III \mid IV$$

$(-3)^2 + b^2 = 5^2$
$b^2 = 16$
$b = 4$

-4

-3

5
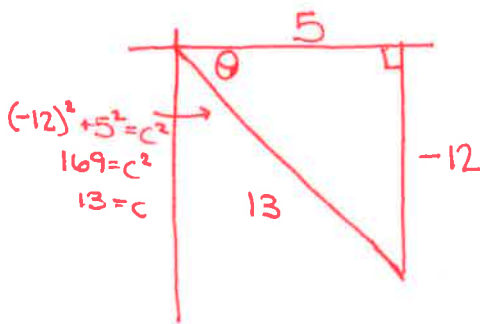
$Sin\theta = \frac{-3}{5}$

$cos\theta = \frac{-4}{5}$

$tan\theta = \frac{3}{4}$

B.) $\tan\theta = -\frac{12}{5}$; terminal side of angle θ lies in quadrant IV
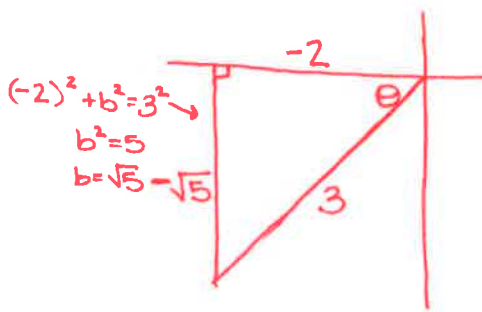
5

$(-12)^2 + 5^2 = c^2$
$169 = c^2$
$13 = c$

13

-12

$Sin\theta = \frac{-12}{13}$

$cos\theta = \frac{5}{13}$

$tan\theta = \frac{-12}{5}$

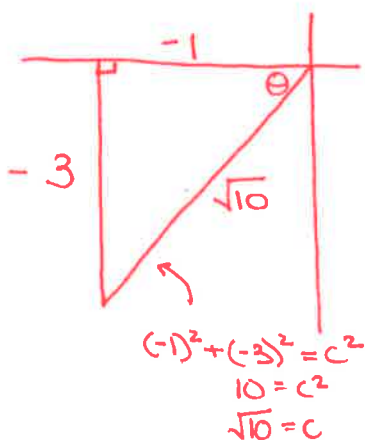C.) $\cos\theta = -\frac{2}{3}$; terminal side of angle θ lies in quadrant III

-2

$(-2)^2 + b^2 = 3^2$
$b^2 = 5$
$b = \sqrt{5} - \sqrt{5}$

3

$Sin\theta = \frac{-\sqrt{5}}{3}$

$cos\theta = \frac{-2}{3}$

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

D.) $\tan\theta = \frac{3}{1}$; terminal side of angle θ lies in quadrant III

-1

-3

$\sqrt{10}$

$(-1)^2 + (-3)^2 = c^2$
$10 = c^2$
$\sqrt{10} = c$

$Sin\theta = \frac{-3}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{-3\sqrt{10}}{10}$

$cos\theta = \frac{-1}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{-\sqrt{10}}{10}$

$tan\theta = \frac{-3}{-1} = 3$