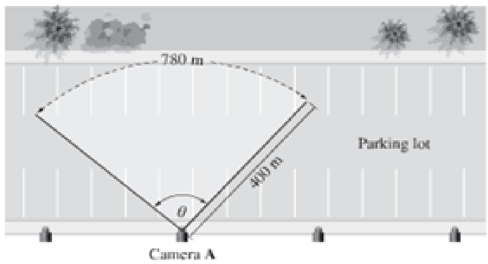
Use the following information to answer the next question.

To prevent car thefts in a parking lot, security cameras are installed on the outer walls of several buildings, as represented in the diagram below. Camera A is programmed to have a recognition range of 400 m and covers an arc length of 780 m.



Note: This diagram is **not** drawn to scale.

$a = r\theta$

$780\text{ m} = 400\text{ m}\,\theta$

$\frac{780 \cancel{m}}{400 \cancel{m}} = \theta$

$\theta = 1.95$ RADS

Convert to degrees:

$1.95 \times \frac{180}{\pi} = \underline{\underline{112°}}$

The value of the angle, θ, to the nearest degree, that Camera A turns through is

A. 290°
B. 112°
C. 92°
D. 29°

Use the following information to answer the next question.

The following statements are made with reference to the unit circle.

T **Statement I** The point $A\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ lies on the unit circle.

Statement II The point $B\left(\frac{1}{\sqrt{2}}, \frac{1}{2}\right)$ lies on the unit circle. FALSE → Pt is $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

T **Statement III** For any point on the unit circle, $x^2 + y^2 = 1$.

Statement IV Any point that lies on the unit circle can be described as $(\sin\theta, \cos\theta)$. FALSE → Pt is $(\cos\theta, \sin\theta)$

The statements that are true are numbered

A. I and III
B. I and IV
C. II and III
D. III and IV

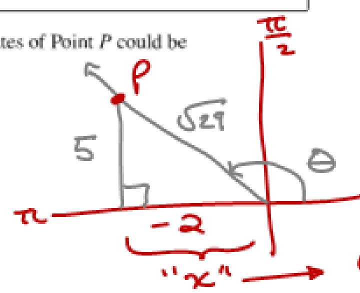
Use the following information to answer the next question.

Point $P(x, y)$ lies on the terminal arm of an angle, θ, in standard position.

Given that $\sin\theta = \frac{5}{\sqrt{29}}$ and $\underbrace{\frac{\pi}{2} \le \theta \le \pi}_{\text{Quad II}}$, the coordinates of Point P could be

$\sin\theta = \frac{5}{\sqrt{29}}$ ← opp ← hyp

A. $(-2, 5)$
B. $(-5, 2)$
C. $(-2, \sqrt{29})$
D. $(-5, \sqrt{29})$



$(x)^2 + (5)^2 = (\sqrt{29})^2$

$x^2 = 29 - 25$

$x = 2$ or -2

Use the following information to answer the next question.

If $\cot\theta = \frac{-1}{\sqrt{3}}$ and $\csc\theta < 0$, where $0 \le \theta < 2\pi$, then the value of θ can be expressed as $\frac{a\pi}{b}$

↖ cscθ is NEG (−) where sinθ is NEG....

S	A
T	C

Quads III + IV

Possible values of a and b are, respectively,

θ MUST be in Quad IV

A. 2 and 3
B. 5 and 3
C. 5 and 6
D. 11 and 6

$\cot\theta = \frac{-1}{\sqrt{3}}$ ← adj ← opp

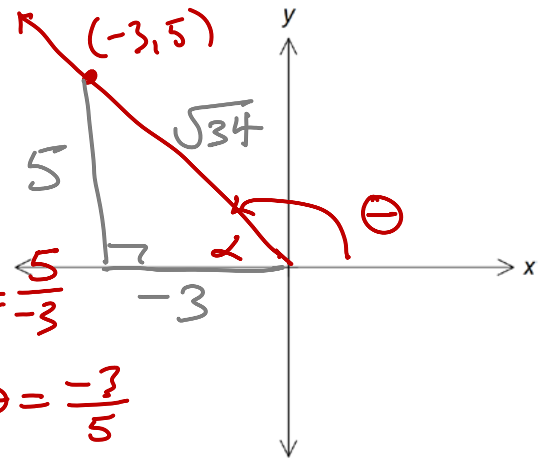
Hyp. is "2"

$\theta = 300°$ or $\boxed{\frac{5\pi}{3}}$

Math 30-1 Trig Quiz I 36 6 Name:____________________________

Part 1 – Written Response

1. An angle in standard position θ has a terminal arm passes through a point (-3, 5).



   (a) Sketch the terminal arm, the position of the angle *(clearly label θ as well as the reference angle α)*, and an appropriate triangle with the exact value of all sides labeled.

   2

   (b) Determine the exact value of all six trigonometric ratios of θ.

   2

$\sin\theta = \frac{5}{\sqrt{34}}$ $\cos\theta = \frac{-3}{\sqrt{34}}$ $\tan\theta = \frac{5}{-3}$

$\csc\theta = \frac{\sqrt{34}}{5}$ $\sec\theta = \frac{\sqrt{34}}{-3}$ $\cot\theta = \frac{-3}{5}$

   (c) Determine the value of θ, correct to the nearest degree **and** hundredth of a radian.

   1

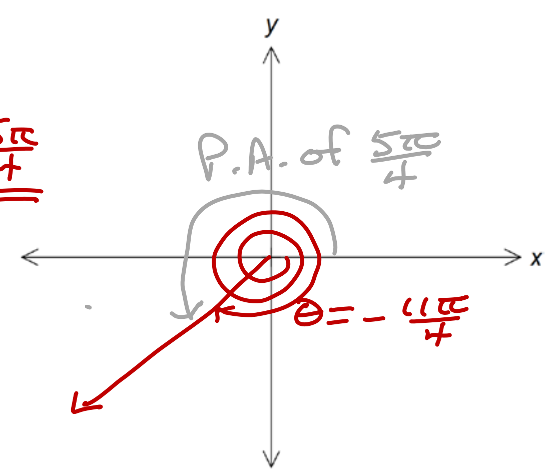
$\alpha = \sin^{-1}(5/\sqrt{34})$ or $\tan^{-1}(5/3) = 59°$ -or- 1.03 RADIANS

(ref. angle)

So, $\boxed{\theta = 121° \text{ or } 2.11 \text{ radians}}$

$180° - 59°$ $\pi - 1.03$ RADS

2. For the angle $\theta = -\frac{11\pi}{4}$,



   (a) **Convert** to degrees

   1

$-\frac{11(180)}{4} \Rightarrow = \underline{-495°}$

   (b) **Determine** the principal angle, in radians.

   1

$-\frac{11\pi}{4} + \underset{\text{"}2\pi\text{"}}{\frac{8\pi}{4}} = -\frac{3\pi}{4} + \underset{\text{"}2\pi\text{"}}{\frac{8\pi}{4}} = \underline{\frac{5\pi}{4}}$

   (c) **Sketch** both θ and the principal angle. *(Label principal angle as "PA")*

   1

   (d) **State** the reference angle, in degrees

   1

Reference Angle, $\alpha = \underline{\frac{\pi}{4}}$

   (e) Use your unit circle or special triangles to **determine** the exact value of $\sin\theta$, $\cos\theta$, ~~and $\tan\theta$~~

   1

$\sin\left(-\frac{11\pi}{4}\right) = \boxed{-\frac{\sqrt{2}}{2}}$ $\cos\left(-\frac{11\pi}{4}\right) = \boxed{-\frac{\sqrt{2}}{2}}$

$\tan\left(-\frac{11\pi}{4}\right) = \boxed{1}$

3. Use your **calculator** to determine the coordinates (nearest hundredth) of a point on the unit circle $P(\frac{5\pi}{9})$.

(What are the coordinates of the point for which the angle in standard position is $\theta = \frac{5\pi}{9}$)

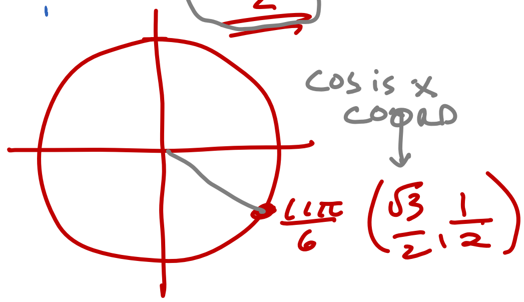
$\sin(5\pi/9) \approx 0.98$ $\cos(5\pi/9) \approx -0.17$

ON CALC, in RADIAN MODE

$P(\frac{5\pi}{9}) = \boxed{(-0.17, 0.98)}$

4. Use your unit circle to determine the exact value of each indicated trigonometric ratio:

(a) $\cos\frac{11\pi}{6} = \boxed{\frac{\sqrt{3}}{2}}$



(b) $\csc 150°$

$= \frac{1}{\sin 150°}$

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

$= \boxed{2}$

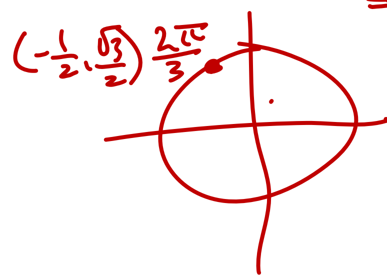
(c) $\tan\frac{8\pi}{3}$

"2π" $\frac{8\pi}{3} - \frac{6\pi}{3}$

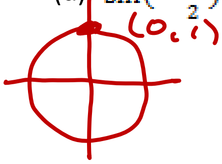
$= \tan\left(\frac{2\pi}{3}\right)$

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

$= \boxed{-\sqrt{3}}$



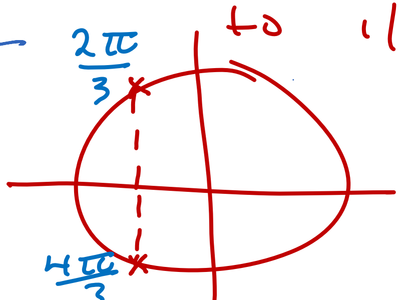
(d) $\sin(-\frac{3\pi}{2}) = \sin\frac{\pi}{2}$



$= \boxed{1}$

5. Use your unit circle to identify the angle(s) between 0 and 2π for which $\cos\theta = -\frac{1}{2}$. *Answer in exact radians – please include a diagram.* **Also** – State a ***general solution*** to $\cos\theta = -\frac{1}{2}$

where on the unit circle is COSINE equal to 1/2?



$\theta = \frac{2\pi}{3}$ or $\frac{4\pi}{3}$

General Solution: $\frac{2\pi}{3} + 2\pi n$, $\frac{5\pi}{3} + 2\pi n$, $n \in I$

6. A point on the unit circle has coordinates $P(-\frac{3}{5}, y)$. Determine the two possible values of y, and the two possible values of θ, correct to the nearest degree. *Please include a diagram.*

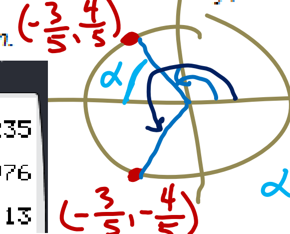
Unit Circle: $x^2 + y^2 = 1$

solve for "y" $(-\frac{3}{5})^2 + y^2 = 1$

$\frac{9}{25} + y^2 = 1$

$y^2 = 16/25 \Rightarrow \boxed{y = \pm\frac{4}{5}}$

```
cos⁻¹(3/5)
        53.13010235
180-Ans
        126.8698976
180+53.13
             233.13
```



Ref Angle $\alpha = \cos^{-1}(3/5) = 53°$

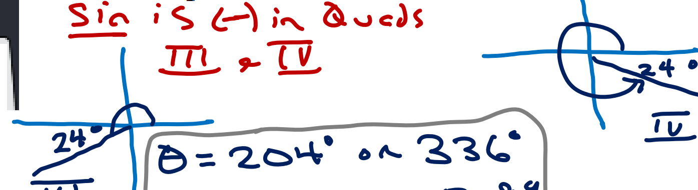
$\boxed{\theta = 127° \text{ or } 233°}$

7. Determine the angles θ such that $\sin\theta = -\frac{2}{5}$. *(Nearest degree and nearest hundredth of a radian. Show all work)*

```
sin⁻¹(2/5)
        23.57817848
```

Ref. Angle (Degree Mode)

Sin is (−) in Quads III & IV



$\boxed{\begin{array}{l}\theta = 204° \text{ or } 336° \\ \theta = 3.53 \text{ or } 5.89\end{array}}$

Radian mode

```
sin(2/5)
        .3894183423
π+Ans
        3.531010996
2π-0.389418
        5.893767307
```