Key (next page)

Accelerated Pre-Calculus Name _____

4.20 Extension for Inverses with Calculator Activity Date _____

Give answers in radians.

Inverse Sine: From the previous handout: Write a formula that uses the principal value solution for $\theta = \sin^{-1} x$ to find the second answer in $[0°, 360°)$.

_____

Now, convert your formula to **radians**. _____

Inverse Tangent: From the previous handout: Write a formula that uses the principal value solution for $\theta = \tan^{-1} x$ to find the second answer in $[0°, 360°)$. _____

Now, convert your formula to **radians**. _____

Inverse Cosine: From the previous handout: Write a formula that uses the principal value solution for $\theta = \cos^{-1} x$ to find the second answer in $[0°, 360°)$. _____

Now, convert your formula to **radians**. _____

Caution: Remember that the principal values for the inverse of sine and the inverse of tangent will return *negative angle values* for Quadrant 4. How do you adjust this result to be a value in $[0°, 360°)$? _____

Now, convert this formula to **radians**. _____

Examples: Find each for $0 \le \theta < 2\pi$ using a calculator. Round to the nearest thousandth of a radian.

Q1
Q2

a. $\sin^{-1}(0.2847)$

$\boxed{0.289}$ and

$\pi - 0.289 = \boxed{2.853}$

Q1, Q4

b. $\cos^{-1}(0.7538)$

Q1 → 0.717

Q4 → $2\pi - 0.717 = 5.566$

Q2, Q4

c. $\tan^{-1}(-3.8565) \rightarrow -1.317$

Q2 → $\pi - 1.317 = 1.8245$

Q4 → $2\pi - 1.317 = 4.966$

Practice: Use a calculator to find two values of θ, where $0 \le \theta < 2\pi$. Round to the nearest thousandth of a radian.

1. $\arccos 0.9857$

2. $\tan^{-1} 20.1923$

3. $\sin \theta = 0.7301$

4. $\arctan(-39.7447)$

5. $\sin^{-1}(-0.3360)$

6. $\cos \theta = -0.4018$
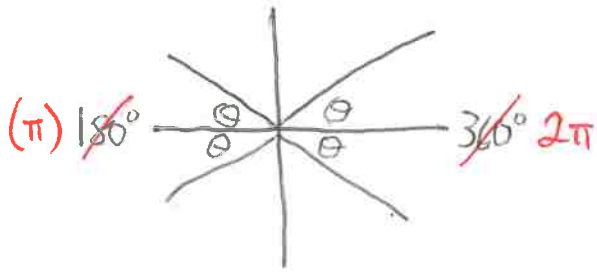
7. $\arcsin(0.7723)$

8. $\cos^{-1}(-0.1689)$

9. $\tan \theta = -0.7350$

4.20 Inverses with calculator Day 2 (Radians) . p.15
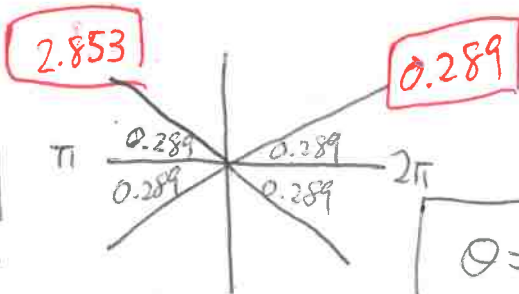
(π) 180° ——————— 360° 2π

Radian Mode

Examples

a) $\sin^{-1}(0.2847)$ | Q1
   | Q2

$\sin\theta = 0.2847$

$\theta = 0.289$

2.853   0.289

π — 0.289 | 0.289 — 2π
      0.289 | 0.289

$\theta = 0.289$ and 2.853

b) $\cos^{-1}(0.7538)$ | Q1
   | Q4

$\cos\theta = 0.7538$

$\theta = 0.717$

0.717

π — 0.717 | 0.717 — 2π
      0.717 | 0.717

5.566

$\theta = 0.717$ and 5.566

c) $\tan^{-1}(-3.8565)$ | Q2
   | Q4

$\tan\theta = -3.8565$

$\theta = -1.317$

1.8245

π — 1.317 | 1.317 — 2π
      1.317 | 1.317
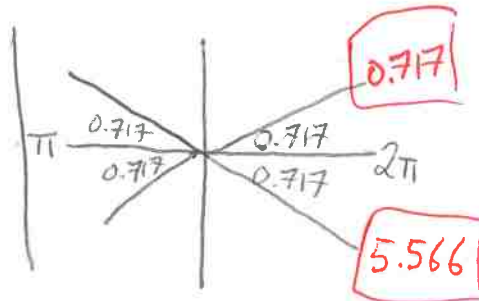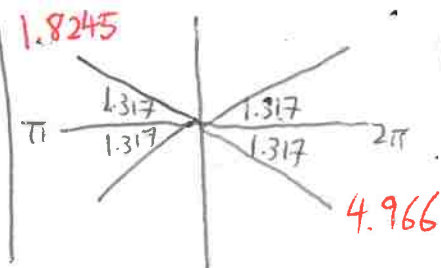
4.966

$\theta = 1.8245$ and 4.966

Practice

1) $\arccos 0.9857$ | Q1
   | Q4

$\cos\theta = 0.9857$

$\theta = 0.1693$

0.1693

0.1693 | — 2π
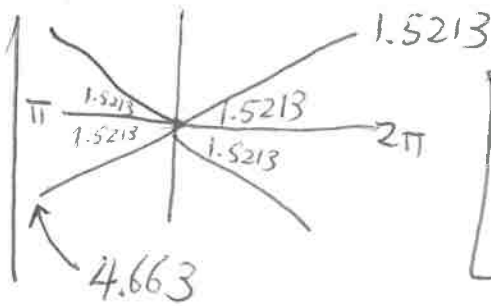0.1693

6.1139
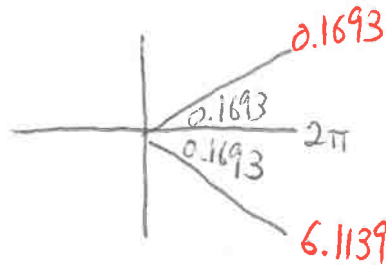
$\theta = 0.169$ and 6.114

2) $\tan^{-1}(20.1923)$ | Q1

$\tan\theta = 20.1923$ | Q3

$\theta = 1.5213$

1.5213

π   1.5213 | 1.5213

1.5213 | 1.5213   2π

4.663

$\boxed{\theta = 1.521 \text{ and } 4.663}$

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3) $\sin\theta = 0.7301$ | Q1

$\theta = \sin^{-1}(0.7301)$ | Q2

$\theta = 0.818$

2.323   0.818

π   0.818 | 0.818

0.818 | 0.818   2π
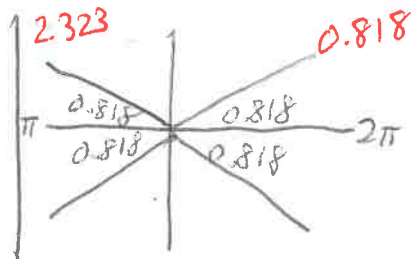
$\boxed{\theta = 0.818 \text{ and } 2.323}$

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4) $\arctan(-39.7447)$ | Q2

$\tan\theta = -39.7447$ | Q4

$\theta = -1.5456$

1.596

1.5456 | 1.5456

π   1.5456 | 1.5456   2π
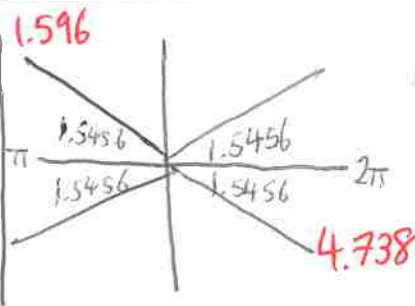
4.738

$\boxed{\theta = 1.596 \text{ and } 4.738}$

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5) $\sin^{-1}(-0.3360)$ | Q3

$\sin\theta = -0.3360$ | Q4

$\theta = -0.34266$

0.3426 | 0.3426

π   0.3426 | 0.3426   2π

3.484   5.941
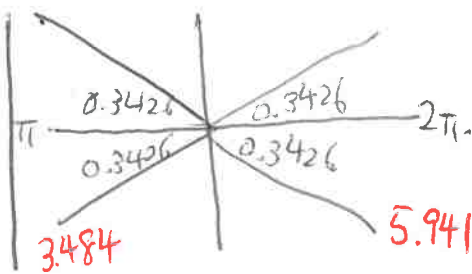
$\boxed{\theta = 3.484 \text{ and } 5.941}$

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6) $\cos\theta = -0.4018$ | Q2

$\theta = \cos^{-1}(-0.4018)$ | Q3

$\theta = 1.98427$

1.98427

π   1.1573 | 1.1573

1.1573 | 1.1573

4.2989

$\boxed{\theta = 1.984 \text{ and } 4.299}$

7) $\arcsin(0.7723)$ | Q1
   $\sin\theta = 0.7723$ | Q2
   $\theta = 0.88245$

2.259   0.8825

π   0.78245   0.88245
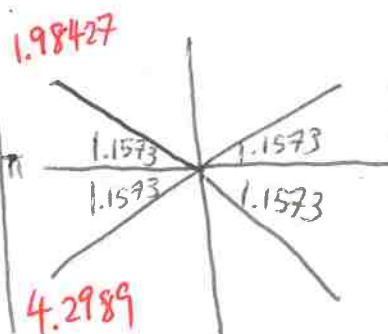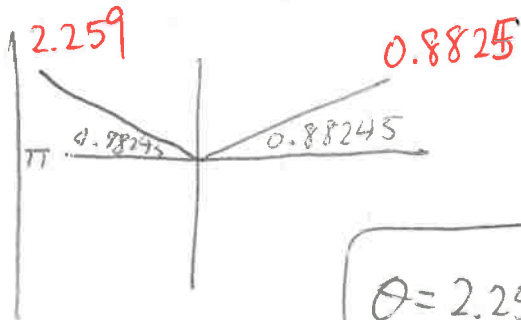
$\theta = 2.259$ and 0.8825

8) $\cos^{-1}(-0.1689)$ | Q2
   $\cos\theta = -0.1689$ | Q3
   $\theta = 1.7405$

1.7405

π   1.401
     1.401

4.54267

$\theta = 1.741$ and 4.543

9) $\tan\theta = -0.7350$ | Q2
   $\theta = \tan^{-1}(-0.735)$ | Q4
   $\theta = -0.6338$

2.5077

π   0-6338   0.6338   2π

5.649

$\theta = 2.508$ and 5.649