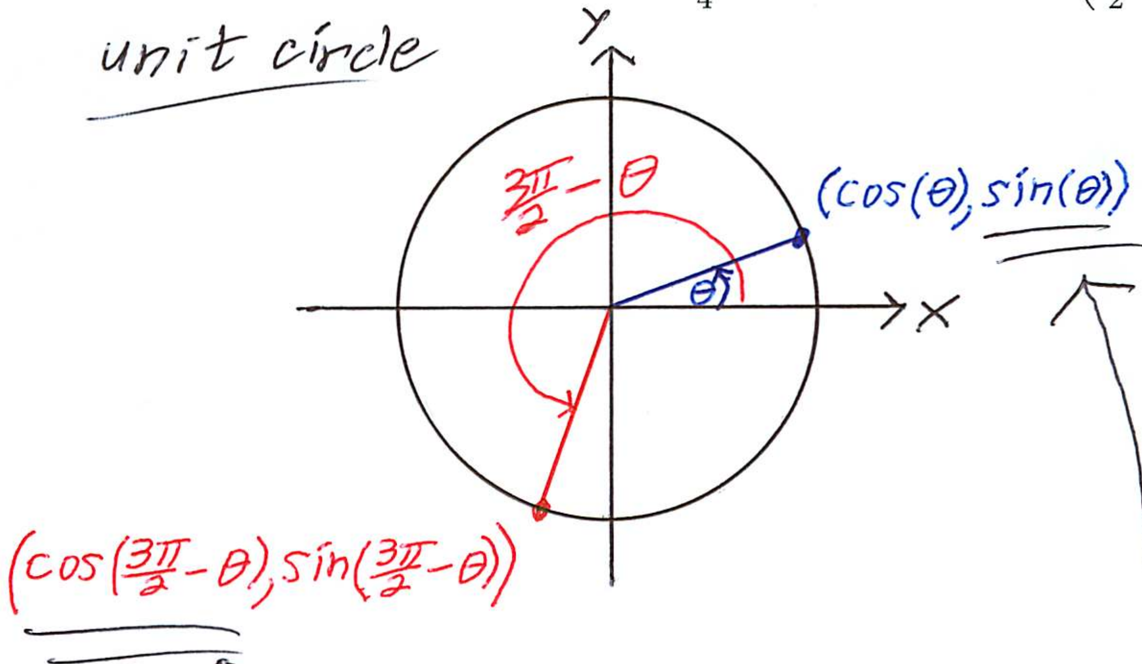
Math 220 (section AD?) **Quiz 1** **Spring 2015**

Name ~~Solutions~~

- You have 15 minutes
- No calculators
- Show sufficient work

1. (3 points) Given an acute angle θ for which $\cos(\theta) = \frac{3}{4}$, evaluate the quantity $\cos\left(\frac{3\pi}{2} - \theta\right)$.

unit circle



This x-coordinate is the negative of this y-coordinate.

$$\cos\left(\frac{3\pi}{2} - \theta\right) = -\sin\theta$$
$$= -\frac{\sqrt{7}}{4}$$

$$\cos^2\theta + \sin^2\theta = 1$$
$$\left(\frac{3}{4}\right)^2 + \sin^2\theta = 1$$
$$\sin^2\theta = \frac{7}{16}$$
$$\sin\theta = \pm\sqrt{\frac{7}{16}}$$

θ is acute so $\sin\theta > 0$.

$$\sin\theta = \sqrt{\frac{7}{16}} = \frac{\sqrt{7}}{4}$$

alternative approach

$$\cos(x-y) = \cos(x)\cos(y) + \sin(x)\sin(y)$$
$$\cos\left(\frac{3\pi}{2} - \theta\right) = \cos\left(\frac{3\pi}{2}\right)\cos(\theta) + \sin\left(\frac{3\pi}{2}\right)\sin(\theta)$$
$$= 0 \cdot \cos(\theta) + (-1) \cdot \sin(\theta)$$
$$= -\sin(\theta)$$
$$= -\frac{\sqrt{7}}{4}$$

2. (4 points) Determine the domain of the given function.

$$h(p) = \frac{\sqrt{p^2+100}}{\sqrt{3-p}-\sqrt{3p-5}}$$

we must have:

(1) $p^2+100 \geq 0$ (always true)

(2) $3-p \geq 0 \Rightarrow p \leq 3$

(3) $3p-5 \geq 0 \Rightarrow p \geq \frac{5}{3}$

we must not have:

(4) $\sqrt{3-p} - \sqrt{3p-5} = 0$

$\sqrt{3-p} = \sqrt{3p-5}$

$3-p = 3p-5$

$8 = 4p$

$p = 2$

Thus $p \leq 3, p \geq \frac{5}{3}$ and $p \neq 2$

domain of h is $[\frac{5}{3}, 2) \cup (2, 3]$

3. (3 points) Determine whether the following function is even, odd or neither. Give a very clear justification for your answer.

$$w(t) = \cos\left(t^4+t^3\right) - \cos\left(t^4-t^3\right)$$

$w(-t) = \cos((-t)^4 + (-t)^3) - \cos((-t)^4 - (-t)^3)$

$= \cos(t^4 - t^3) - \cos(t^4 + t^3)$

$= -(\cos(t^4+t^3) - \cos(t^4-t^3))$

$= -w(t)$

w is odd