Math 220 (section AD?) Quiz 1 Spring 2019

Name: Solutions

- You have 20 minutes
- No calculators
- Show sufficient work

1. (2 points) Evaluate and simplify the following quantity.

$$4\cos^2(\pi/5) + 4\sin^2(\pi/5) - 3\sec^2(\pi/5) - 6\csc^2(\pi/5) + 3\tan^2(\pi/5) + 6\cot^2(\pi/5)$$

$= 4\left(\cos^2(\tfrac{\pi}{5}) + \sin^2(\tfrac{\pi}{5})\right)$
$- 3\left(\sec^2(\tfrac{\pi}{5}) - \tan^2(\tfrac{\pi}{5})\right)$
$- 6\left(\csc^2(\tfrac{\pi}{5}) - \cot^2(\tfrac{\pi}{5})\right)$
$= 4\cdot 1 - 3\cdot 1 - 6\cdot 1$
$= -5$

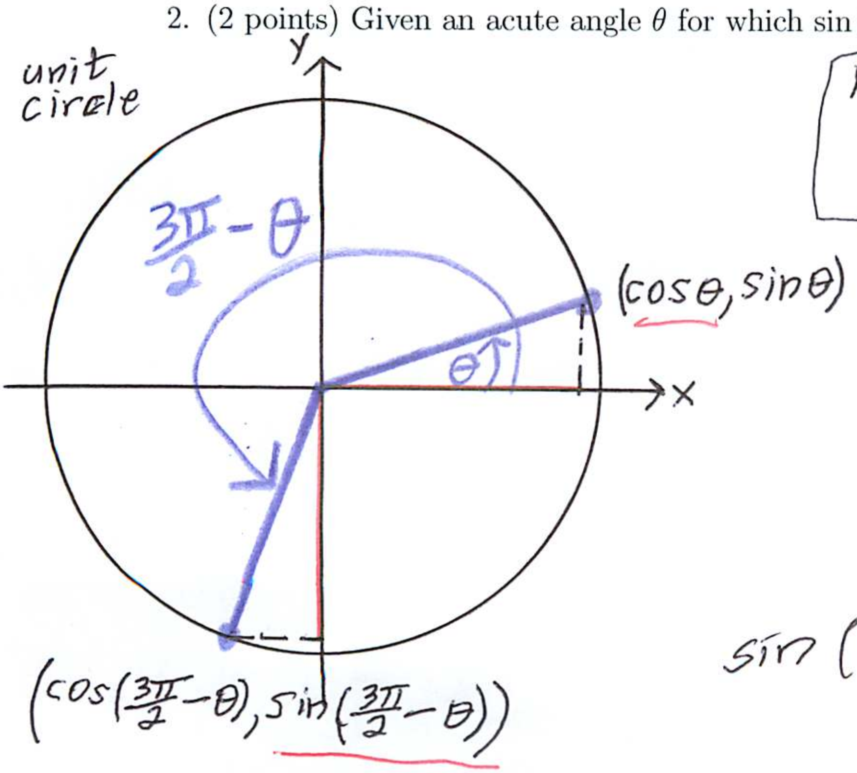
identities.

$\cos^2\theta + \sin^2\theta = 1$

$\tan^2\theta + 1 = \sec^2\theta \Rightarrow$
$\sec^2\theta - \tan^2\theta = 1$

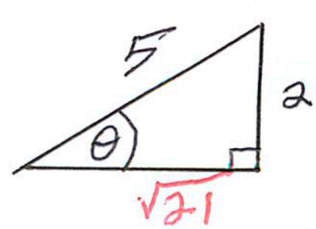
$\cot^2\theta + 1 = \csc^2\theta \Rightarrow$
$\csc^2\theta - \cot^2\theta = 1$

2. (2 points) Given an acute angle θ for which $\sin(\theta) = 2/5$, evaluate $\sin\left(\dfrac{3\pi}{2} - \theta\right)$.



From the unit circle,
$\sin\left(\tfrac{3\pi}{2} - \theta\right) = -\cos\theta$

θ acute and $\sin\theta = \frac{2}{5} \left(\frac{\text{opp}}{\text{hyp}}\right)$



Pythagorean Thm
$A^2 + 2^2 = 5^2$
$A = \sqrt{21}$

$\sin\left(\tfrac{3\pi}{2} - \theta\right) = -\cos\theta$
$= \dfrac{-\sqrt{21}}{5} \quad \left(\dfrac{\text{adj}}{\text{hyp}}\right)$

3. (3 points) State the domain of the function using interval notation.

$$f(x) = \frac{8\sin(x^2 - 25)}{4 - \sqrt{2x - 6}}$$

① $8\sin(x^2-25)$ has no restriction on the domain.

② From $\sqrt{2x-6}$, $2x-6 \geq 0 \Rightarrow x \geq 3$

③ denominator $=0$ when $4-\sqrt{2x-6}=0$

$$4 = \sqrt{2x-6}$$
$$16 = 2x-6$$
$$22 = 2x$$
$$x = 11$$

Thus, $x \neq 11$

domain of $f(x)$: $[3,11) \cup (11,\infty)$ ☆

4. (3 points) Use the definitions of even and odd functions to prove whether the following function is even, odd or neither.

$$f(x) = \frac{x^4 \sin(x^3)}{x^5 - x^9}$$

$$f(-x) = \frac{(-x)^4 \sin((-x)^3)}{(-x)^5 - (-x)^9}$$

$$= \frac{x^4 \sin(-x^3)}{-x^5 + x^9}$$

since sin is odd

$$= \frac{x^4 \cdot (-\sin(x^3))}{-(x^5 - x^9)}$$

$$= \frac{x^4 \sin(x^3)}{x^5 - x^9}$$

$$= f(x)$$

since $f(-x) = f(x)$

f is an even Function