

Math 130 Precalculus Spring 10 Sample midterm 2

- (1) (15 points) Solve the inequality $\frac{x-3}{x+2} \leq \frac{x-4}{x+3}$. Write your answer in interval notation.
- (2) (10 points) Let $f(x) = -3x^2 - 6x + 1$ and $g(x) = 2x - 3$. Compute and simplify $(f \circ g)(x)$.
- (3) (10 points) If $f(x) = \frac{2x}{x-3}$, find and simplify $f^{-1}(x)$?
- (4) (10 points) Prove the following identity:

$$\frac{1}{\sin(x)} - \sin^3(x) = \sin(x) \cos^2(x) + \cos(x) \cot(x)$$

- (5) (10 points) Prove the following identities:
- (a) $2 \sin^2(x) + \cos(2x) = 1$
- (b) $(\sin(x) + \cos(x))^2 = 1 + \sin(2x)$
- (6) (15 points) Sketch one period of the graphs of the following functions.

$$f(x) = \sin\left(\frac{1}{4}x\right), \quad g(x) = \cos(x - \pi), \quad h(x) = 2 \sin(x) + 1$$

- (7) (15 points) Sketch one period of the graph $y = 50 \cos\left(\frac{1}{2}x - \frac{\pi}{4}\right)$. Label the lowest points, the highest points and the x-intercepts of the graph with their coordinates.
- (8) (15 points) If $\sin(u) = -\frac{8}{17}$, (u in quadrant III), use suitable identities to find the values of the following: (a) $\sin(2u)$, (b) $\cos(2u)$, and (c) $\tan(2u)$. Write all answers as fractions. In which quadrant is the angle $2u$?