

Name _____

Place your answers in the space provided. You must show your work to receive credit.

Note: There is no partial credit for problems 1–3.

- (8 pts) 1. If $\sin \theta = \frac{1}{5}$ and θ is an acute angle, find the exact value of $\cos 2\theta$. (Do NOT use a calculator.)

$$\cos 2\theta = \boxed{}$$

- (8 pts) 2. Find all the solutions in radians for the following. (Do NOT use a calculator.)

$$\sec \theta = 2$$

$$= \boxed{}$$

- (8 pts) 3. Find the exact value. (Do NOT use a calculator.)

$$\tan \frac{1}{2} \sin^{-1} \frac{3}{5}$$

$$\tan \frac{1}{2} \sin^{-1} \frac{3}{5} = \boxed{}$$

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(12 pts) 4. Verify the identity. Work with only one side at a time.

$$\frac{1}{1 - \cos} + \frac{1}{1 + \cos} = 2 \csc^2$$

(12 pts) 5. If θ is in quadrant III with $\tan \theta = \frac{4}{3}$ and ϕ is in quadrant II with $\cos \phi = -\frac{5}{6}$
find $\sin(\theta - \phi)$.

$$\sin(\theta - \phi) =$$

(12 pts) 6. Find all the solutions in the interval $[0, 2\pi)$ for

$$2 \cos^2 \theta - \cos \theta - 1 = 0$$

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- (14 pts) 7. A ship leaves port at 1:00 pm and sails in the direction $N 34^\circ W$ at a rate of 24 mi/hr. Another ship leaves the same port at 1:30 pm and sails in the direction $N 56^\circ E$ at a rate of 18 mi/hr. At 3 pm, what is the bearing, to the nearest degree, from the first ship to the second? (Draw and label a sketch, write an equation(s), and solve.)

Bearing =

- (12 pts) 8. A buyer is interested in purchasing a triangular lot with vertices LOT, but unfortunately, the marker at point L has been lost. The deed indicates that TO is 453 feet and LO is 312 feet, and the angle at O is 82.6° . What is the distance from L to T? (Draw and label a sketch, write an equation(s) and solve.) Round your answer to the nearest tenth of a foot.

Distance =

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- (14 pts) 9. A ski lift is planned for the south slope of Mt. Frissell in Connecticut. A surveyor determines the angle of elevation from the start of the lift to the end of the lift is 34.06° . On level ground 1000 feet away from the start, the angle of elevation to the end of the lift is 27.77° . What is the length of the ski lift? (Draw and label a sketch, set up an equation(s) and solve.) Round your answer to the nearest foot.

Length =