1. (20 points) Short Answer. Show all Work.

(a) Evaluate the following:

i. \( \sin(270^\circ) \)  

ii. \( \cos\left(\frac{3\pi}{4}\right) \)  

iii. \( \tan\left(-\frac{2\pi}{3}\right) \)  

iv. Evaluate the expression \( 4(\sin(30^\circ))^2 + 4(\cos(30^\circ))^2 \)  

2. (14 points) A cyclist is riding a bicycle whose wheels have a diameter of 24 inches. Suppose the wheels turn at a rate of 30 revolutions per minute. Find the speed of the cyclist in feet per minute.
3. (20 points) The temperature of a car engine after it is turned off is modeled by the equation

\[ \log \left( \frac{F - 20}{200} \right) = -0.4t \]

where \( F \) is the temperature in degrees Fahrenheit and \( t \) is the time in minutes after the engine is turned off. Give your answers with the correct units.

(a) At what time \( t \) does the temperature of the engine reach 40\(^\circ\)F?

(b) What is the temperature of the engine when it is turned off?

(c) Solve the given equation for \( F \) to obtain an equation for \( F \) in terms of time \( t \).

(d) What temperature does the engine approach as \( t \to \infty \)?
4. (14 points) Given \( f(x) = \frac{x - 1}{5 - x} \),

(a) Find \( f^{-1}(-3) \).

(b) Find the range of \( f^{-1} \).

5. (12 points) Solve the following for \( x \): \( e^x + 2 = 8e^{-x} \)

6. (20 points) Answer the following questions as either TRUE or FALSE. For this problem only, you do not need to justify your answer.

(a) \( \log \left( \frac{x}{y} \right) = \frac{\log x}{\log y} \) \hspace{1cm} TRUE / FALSE

(b) \( -\ln A = \ln \left( \frac{1}{A} \right) \) for \( A \neq 0 \) \hspace{1cm} TRUE / FALSE

(c) The domain of \( f(x) = \ln x + \ln(8 - x) \) is \((0, 8)\) \hspace{1cm} TRUE / FALSE

(d) \( \frac{1}{\sec^2 x} = 1 - \sin^2 x \) \hspace{1cm} TRUE / FALSE