The following questions are intended only to provide you with practice problems when studying for the exam and is not a guarantee of what will be on the actual examination. The questions on the actual may very in form and content from what is presented here.

1. Consider the function $f(x) = 8 + 4\ln(3x - 9)$.
   (a) Find a formula for $f^{-1}(x)$, the inverse of $f(x)$.
   (b) What is the range of $f(x)$?
   (c) What is the range of $f^{-1}(x)$?
2. Evaluate $\log_{16} 32$.
3. If $\log_{16} y = 30$, what is $\log_2 y$?
4. If $\ln u = 2$ and $\ln v = -4$, compute
$$\ln\left(\frac{\sqrt{u^3 v}}{e^2}\right)$$
5. In each of the following problems, find a number x so that the equation is true.
   (a) $\ln(\ln x) = 10$
   (b) $\log_5(\log_2 x) = 1$
6. Solve the equations for x:
   (a) $e^{2x} + 3e^x = 1$
   (b) $10^{x^2+3x} = 0.01$
7. Solve the equations for x
   (a) $\log_4(x - 4) - \log_4(x - 2) = 2$
   (b) $\dfrac{\ln(13x)}{\ln(4x)} = 2$
8. Solve for x and y in the following system
$$\begin{cases} x^2 + \ln y = 7 \\ 2x^2 - 3\ln y = 13 \end{cases}$$
9. Suppose f is a function of exponential growth with $f(2) = 3$ and $f(5) = 8$. Evaluate $f(10)$.
10. An earthquake of Richter magnitude 7.2 is how many times more powerful than an earthquake of magnitude 4.2?
11. If an account with \$1000 earns 6% annual interest compounded 12 times per year, write the formula for $A(t)$, the balance of the account after t years.
12. If an account earns 8% annual interest compounded continuously, what is the doubling time? Express your answer as an exact value.

13. A bacteria colony is growing exponentially and triples in size every 12 hours. How long does it take to quadruple in size? Express your answer as an exact value.

14. Evaluate the following
    (a) $\cos(300^\circ)$
    (b) $\sin(360045^\circ)$
    (c) $\cos \frac{15\pi}{4}$
    (d) $\sin \frac{4\pi}{3}$

15. Suppose $\sin\theta = \frac{2}{9}$. Evaluate $\cos\theta$ if
    (a) $0 < \theta < \frac{\pi}{2}$
    (b) $\pi < \theta < \frac{3\pi}{2}$

16. On a sketch of the unit circle, draw the two radii corresponding to an angle θ for which $\cos\theta = -1/3$. Find the coordinates of the endpoints of both radii.

17. A pizza has a diameter of 16 inches and a particular slice from this pizza has area of 4 square inches. Find the angle measure of this slice in radians.

18. Find the first four positive values of x such that $\sin x = \frac{1}{2}$.