Practice Questions for Exam 3

Exam 3 covers all material we covered from Chapters 3.1-4.6. The practice questions are not comprehensive; they are only a sample of the type of question you could see on the exam.

1. Graph on the same coordinate system. Label the graphs with the equation it represents. Use transformations of the graph from part (a) to graph the remaining parts.
   a. \( f(x) = 2^x \)
   b. \( f(x) = -2^x \)
   c. \( f(x) = 2^{x-1} - 3 \)
   d. \( f(x) = \left(\frac{1}{2}\right)^x \)

2. Graph on the same coordinate system. Label the graphs with the equation it represents. Use transformations of the graph from part (a) to graph the remaining parts.
   a. \( g(x) = \log_2 x \)
   b. \( g(x) = \log_2 (x + 2) \)
   c. \( g(x) = 2 - \log_2 x \)
   d. \( g(x) = \frac{1}{2} \log_2 x \)

3. Write in exponential form: \( \log 1000 = 3 \)
4. Write in logarithmic form: \( \sqrt{8} = 2 \)
5. Expand: \( \log \frac{2x^4\sqrt{x+1}}{3(x-2)^4} \)
6. Find the domain: \( g(x) = \log(x^2 - 4x - 12) \)
7. Condense: \( \frac{1}{2} [4\ln x - \ln(x + 1) + \ln(x - 1)] \)
8. Solve each equation.
   a. \( 4^x = \frac{1}{\sqrt{2}} \) (without a calculator)
   b. \( e^{2x} + 5e^x - 24 = 0 \) (without calculator)
   c. \( 9e^x = 107 \) (calculator OK)
   d. \( \log_4 (2x - 1) = \frac{1}{2} \)
   e. \( \log(x + 2) - \log(3x - 1) = 0 \)
   f. \( \log_2 (x - 1) + \log_2 (x + 3) = 2\log_2 x \)
   a. \( \ln e^{2x} \)
   b. \( 3^{\log_3 x} \)
   c. \( \log_b 1 \)
   d. \( \log_b b \)
   e. \( \log_{\sqrt{b}} b \)
   f. \( \log_5 \frac{1}{25} \)
10. The 1990 population of Europe was 509 million; in 2000, it was 729 million.
   a. Write the exponential growth function that describes the population of Europe, in millions, \( t \) years after 1990.
   b. Use the model to predict the population in 2008.
11. Convert to radians: \( 135^\circ \).
12. Convert to degrees:  a) $\frac{5\pi}{3}$  b) 1  c) $\frac{7\pi}{5}$

13. An angle whose terminal side in is the fourth quadrant intersects the unit circle at $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$. Find the values of the six trigonometric functions for this angle.

14. Find the exact value of each expression. Do not use a calculator.
   a. $\sec\frac{3\pi}{2}$
   b. $\tan4.7\cot4.7$
   c. If $\sin t = \frac{2\sqrt{7}}{7}$ and $0 \leq t < \frac{\pi}{2}$, use identities to find the remaining trigonometric functions.

15. When a six foot pole casts a four foot shadow, what is the angle of elevation of the sun?

16. Use the triangle to find each of the six trig functions of $\theta$.
18. Find the exact value of the remaining trigonometric function. \( \tan \theta = \frac{5}{12} \) and \( \cos \theta < 0 \).

19. Use reference angles to find the exact value. Do not use a calculator. \( \cos \frac{23\pi}{4} \)

20. Find the exact value. Do not use a calculator. \( \sin \frac{3\pi}{2} \tan\left(\frac{-15\pi}{4}\right) - \cos\left(\frac{-5\pi}{3}\right) \)

21. Graph one period. Label the important points on the x-axis. \( y = -3 \sin(2x + \frac{\pi}{2}) \)

22. Graph two periods of \( y = 2 \tan \frac{x}{4} \)