1. Given \( f(x) = x^2 + 7 \), \( g(x) = \sqrt{x + 1} \) and \( h(x) = \frac{x+2}{9-x} \), find the following composite functions and state their domains:
   a. \( g(f(x)) \)
   b. \( f(g(8)) \)
   c. \((h \circ g)(x)\)
   d. \((f \circ h)(x)\)
   e. \( f(g(h(x))) \)

2. If \( g(x) = f(-2x) + 5 \), describe the different transformations that \( f(x) \) goes through.

3. If \( f(x) = 3x^2 + 7x \) and \( h(x) = (g \circ f)(x) = 9x^4 + 42x^3 + 49x^2 - 10 \), find \( g(x) \).

4. If \( f(x) = 3x + 6 \) and \( h(x) = f(g(x)) \), where \( h(x) = 3x^2 + 3x + 9 \), find \( g(x) \).

5. Simplify the following expressions:
   a. \((3x)^2(x^4)^{-1}(8x^5)^0\)
   b. \(\log(x - 5) + \log(x + 2) - 10 \log(2x + 5)\)
   c. \(\frac{e^{(x-4)}e^{(1+3x)}}{(e^{x+1})^3}\)

6. Are the following functions one-to-one? If yes, find their inverse functions.
   a. \( g(x) = 3x^3 - 7 \)
   b. \( h(x) = \frac{1}{x+5} \)
   c. \( f(x) = x^2 + 2 \)
   d. \( F(x) = \ln(x - 3) \)

7. Find the exact value of each expression:
   a. \( \ln(1/e) \)
   b. \( 10^{\log_{10}\sqrt{10}} \)
   c. \( \log_{81}(1/9) \)

8. Solve for \( x \):
   a. \( 16^{2x+5} = 4^{3x} \)
   b. \( 7 + e^{x+5} = 10 \)
   c. \( \ln(3x + 2) = 5 \)
   d. \( \ln(\ln(x) + 7) = 2 \)
9. Given $\log_a 5 = 0.5943$ and $\log_a 2 = 0.2560$, find
   a. $\log_a 100$
   b. $\log_a \frac{125}{2}$

10. A colony of bacteria triples every 2 hours. If the current population has a count of 100,
   a. What will the population be after 8 hours? After 23 hours?
   b. Find an expression for the population after $t$ hours?
   c. After how many hours will the population reach 1 million?

11. A radioactive substance has a half life of 8 days. If we start with 50 gms of the substance,
   a. Find an expression for the radioactive decay of this substance
   b. What is the size of the sample after 24 days?
   c. After how many days is there only 2 gms of the substance left?

12. Rewrite $\log_5(e^2)$ in terms of log with base $= e$ using the change of base formula.

Note: With many thanks to Kendra Kilmer