MTH 1000, Exam 2 Practice

1. Divide the polynomials by long division or synthetic division (if applicable).
   (a) $\frac{x^3-12x^2+31x+30}{y^2-6y-5}$
   (b) $\frac{x^3-x^2+2x+4}{x-2}$
   (c) $\frac{2x^5+5x^4-2x^3+2x^2-2x+3}{x+3}$
2. Find the domain, range, all x- and y-intercepts, and all vertical/horizontal/oblique asymptotes of each function and sketch each graph.
   (a) $f(x) = x^3 + 2x^2 - 8x$
   (b) $f(x) = \frac{x+3}{x-1}$
   (c) $f(x) = \frac{x^2-1}{x}$
   (d) $f(x) = \frac{2x^2-5x+2}{x^2-4}$
   (e) $f(x) = 2\log(-x)$
   (f) $f(x) = -e^{x-2} + 1$
3. Let $f(x) = x^2$ and $g(x) = \sqrt{x-3}$.
   (a) Find a formula for $(f \circ g)(x)$ and its domain.
   (b) Find a formula for $(g \circ f)(x)$ and its domain.
4. Find the inverse of each function, if possible, or write why the inverse does not exist, and write the domain and range of each function f and its inverse f^{-1}.
   (a) $f(x) = x^2$
   (b) $f(x) = -2\sqrt[3]{x-3} + 4$
   (c) $f(x) = \frac{2x}{3x-1}$
5. Solve the exponential equations. If exact calculation is not feasible, write the answers in terms of log or ln.
   (a) $3^x = 9$
   (b) $3^x = 10$
   (c) $5^{x+2} = 25$
   (d) $e^{-x^2} = \frac{(e^x)^2}{e^3}$
   (e) $5^{x+2} = e^{3x+2}$
6. Find the exact value of each logarithm.
   (a) $\ln e$
   (b) $\log_2 16$
   (c) $\log_3 \frac{1}{27}$
   (d) $\log_\pi 1$
7. Solve the logarithmic equations.
   (a) $\log_3(x) = 2$
   (b) $\log_3(x+2) - 1 = -\log_3(x+4)$
   (c) $\ln(x) = \ln(x+6) - \ln(x-4)$