1. For each function, find its inverse, and sketch the graphs of the original function and its inverse.

   (a) $f(x) = e^x - 2$ (c) $f(x) = \ln(x + 3) + 2$

   (b) $f(x) = 2^{-x}$

2. Find the exact value of

   (a) $\log_5 \left(\dfrac{1}{125} \right)$ (d) $\arcsin(1)$

   (b) $\log_6 2 + \log_6 3$ (e) $\arccos \left(\dfrac{1}{2} \right)$

   (c) $3 \log_8 4$ (f) $\sin \left(\arctan \left(\dfrac{3}{4} \right) \right)$

3. Evaluate the limits.

   (a) $\displaystyle \lim_{x \to 0} \frac{\sin 5x}{2 \sin 3x}$ (d) $\displaystyle \lim_{x \to \infty} x^3 e^{-3x}$

   (b) $\displaystyle \lim_{x \to 0} \frac{e^x (\cos x - 1)}{\tan(3x)}$ (e) $\displaystyle \lim_{x \to \infty} \left(\frac{x}{x+1} \right)^{3x}$

   (c) $\displaystyle \lim_{x \to 0} \frac{e^x - 1 - x}{x^2}$

4. Evaluate the following integrals.

   (a) $\displaystyle \int x \sin(x^2) dx$ (j) $\displaystyle \int (\ln(5x))^3 dx$

   (b) $\displaystyle \int_{\pi/6}^{\pi/2} \cos^2 x \, dx$ (k) $\displaystyle \int \frac{4x + 3}{x^2 + 1} dx$

   (c) $\displaystyle \int \frac{4x + 3}{x + 1} dx$ (l) $\displaystyle \int (\cos x)^3 (\sin x)^2 dx$

   (d) $\displaystyle \int_1^2 x e^x dx$ (m) $\displaystyle \int \frac{1}{(2 - 3s)^5} ds$

   (e) $\displaystyle \int_0^\pi \sin^5 t \, dt$ (n) $\displaystyle \int \frac{1}{\sqrt{x^2 + 9}} dx$

   (f) $\displaystyle \int_0^{\pi/4} \sec^2 x e^{\tan x} dx$ (o) $\displaystyle \int \frac{e^x + 5}{e^x + 3} dx$

   (g) $\displaystyle \int x^2 \sin(2x) dx$ (p) $\displaystyle \int \frac{x^2}{x^2 + 5x + 6} dx$

   (h) $\displaystyle \int \frac{1}{x^2 \sqrt{4 - x^2}} dx$ (q) $\displaystyle \int x \sqrt{4x^2 - 1} \, dx$

   (i) $\displaystyle \int \frac{7x + 12}{x^3 + 4x^2} dx$