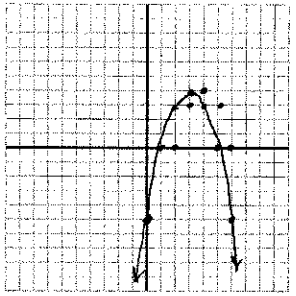
Do all problems. Give exact answers unless otherwise directed.

1. Graph the following functions on the grids provided.

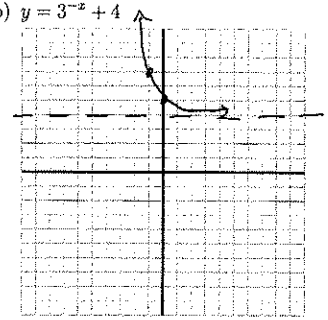
(a) $y = 4 - (x-3)^2$

→ 3
↑ 4
vert. refl.



(b) $y = 3^{-x} + 4$

horiz refl
↑ 4



2. Assume that $f(x) = \dfrac{2x+1}{x-2}$ is one-to-one. Find its inverse function.

$y = \frac{2x+1}{x-2}$

$xy - 2y = 2x + 1$

$xy - 2y = 2y + 1$

$x(y-2) = 2y+1$

$x = \frac{2y+1}{y-2}$ $\quad f^{-1}(x) = \frac{2x+1}{x-2}$

3. Evaluate each of the following exactly.

(a) $\log_3(81)$

$= \log_3(3^4)$

$= 4$

(b) $\log_{25}\left(5\sqrt{5}\right) = y$

$25^y = 5\sqrt{5} = 5^{\frac{3}{2}}$

$5^{2y} = 5^{\frac{3}{2}}$

$2y = \frac{3}{2}$

$y = \frac{3}{4}$

(c) $e^{\ln(5\sqrt{19})}$

$= 5\sqrt{19}$

4. An account has an initial deposit of \$7250 and the interest is 5.2%, compounded monthly.

(a) Find the amount of money in the account in 15 years, to the nearest cent.

$A = 7250\left(1 + \frac{.052}{12}\right)^{12(15)} \approx \$15\,789.04$

(b) How long does it take for the balance in the account to reach \$10000, to the nearest month?

$10000 = 7250\left(1 + \frac{.052}{12}\right)^{12t}$

$\ln\left(\frac{10000}{7250}\right) = 12t \ln\left(1 + \frac{.052}{12}\right)$

$t = \frac{\ln\left(\frac{1000}{725}\right)}{12\ln\left(1 + \frac{.052}{12}\right)} \approx 6.198 \text{ yrs} \approx 6\text{yrs}, 2\text{mos}$

5. If $\log_a(2) = .8033$ and $\log_a(7) = 2.2552$, then find $\log_a\left(2\sqrt{7}\right)$.

$.8033 + \frac{1}{2}(2.2552) = \begin{array}{r} .8033 \\ 1.1276 \\ \hline 1.9309 \end{array}$

6. Solve the following equations. Give the exact answers.

(a) $3^{2x-1} = 4^{x-2}$

$(2x-1)\ln 3 = (x-2)\ln(4)$

$2x\ln(3) - \ln(3) = x\ln(4) - 2\ln(4)$

$2x\ln(3) - x\ln(4) = \ln(3) - 2\ln(4)$

$x(2\ln(3) - \ln(4)) = \ln(3) - 2\ln(4)$

$x = \frac{\ln(3) - 2\ln(4)}{2\ln(3) - \ln(4)}$

(b) $\log_2(x) + \log_2(x-1) = 1$

$\log_2(x(x-1)) = 1$

$2^1 = x^2 - x$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$x = 2$ or $x = -1$

$\boxed{x = 2}$