

Review Problems from the New Material:

1. Let $p(x) = 2x^3 + 5x^2 - 21x - 10$. (a) According to the rational zero test what are the only possible rational zeros of $p(x)$? (b) Use your calculator to graph $y = p(x)$ and determine all of the actual rational zeros of $p(x)$. (c) Use long division to factor $p(x)$ and then find all of the real zeros of $p(x)$. Give the exact values.
2. (a) Use your calculator to find all the real zeros of $f(x) = x^3 - 8x^2 + x + 42$. (b) Use your answer to (a) to factor $f(x)$ completely.
3. (an old topic.) Solve. $x^2 - 2x + 2 = 0$.
4. Sketch the graph of $f(x) = \frac{2x^2-6}{x^2-1}$. Indicate the x -intercept(s), y -intercept(s), vertical asymptote(s) and horizontal asymptote(s).
5. Sketch graph of $h(x) = \log_4(x-3)$. Identify the domain of $h(x)$, the intercepts and the asymptotes.
6. Evaluate (a) $\log_5(1/25)$, (b) $\log_{27} 9$, (c) $\ln(e^3)$, (d) $\log_5(10)$.
7. (a) Write as a sum, difference, and/or multiple of logs. $\ln(\sqrt{y}/z^5)$. (b) Write as a single log. $5 \ln x + 2 \ln y - 4 \ln z$.
8. Solve. (a) $3e^x - 8 = 23$. (b) $-6 + \ln 3x = 0$.
9. Find the time required for \$1000 to double at a rate of 12% compounded continuously.
10. Use your calculator to find all points of intersection of $y = 3 + x - x^2$ and $y = 3e^{x-3} - 2$.
11. Solve the system: $x + 7y = 12$, $3x - 5y = 10$.
12. Ten gallons of a 30% acid solution is obtained by mixing a 20% with a 50% solution. How much of each must be used?
13. Solve the system $x + 2y - z = 2$, $2x - 4y + 3z = 3$, $-x + 3y + 2z = 11$. (a) Do it by hand first, showing all of your work. (b) Input the augmented matrix on your calculator and put it into RREF form to solve the system.
14. Solve the system $x - 2y = 1$, $y = \sqrt{x - 1}$ by hand.
15. Put the matrix $\begin{bmatrix} 2 & 4 & 8 \\ 1 & 3 & 7 \end{bmatrix}$ into RREF form. Do it by hand and on your calculator.
16. Write the system of equations represented by the augmented matrix below, and solve the system.

$$\left[\begin{array}{ccc|c} 1 & 3 & -1 & 1 \\ 0 & 1 & 2 & 5 \\ 0 & 0 & 1 & 2 \end{array} \right]$$

Answers:

1. (a) $\pm 1, \pm 2, \pm 5, \pm 10, \pm 1/2, \pm 5/2$, (b) $5/2$, (c) $p(x) = 2(x - \frac{5}{2})(x^2 + 5x + 2)$,
zeros: $x = \frac{5}{2}, \frac{-5 \pm \sqrt{17}}{2}$
2. (a) $-2, 3, 7$ (b) $f(x) = (x - 7)(x + 2)(x - 3)$.
3. $1 \pm i$
4. x -intercepts = $(\pm\sqrt{3}, 0)$. y -intercept = $(0, 6)$. vertical asymptotes: $x = \pm 1$.
horizontal asymptote: $y = 2$. Note, for any rational function there is at most
one y -intercept and at most one horizontal asymptote. Input the graph on your
calculator as $y = (2x^2 - 6)/(x^2 - 1)$, [6:Standard] and sketch it. Draw dotted lines
for the asymptotes and label the tick-marks on the axes.
5. Domain: $x > 3$. Vertical Asymptote: $x = 3$. x -intercept: $(4, 0)$. There is no
 y -intercept and no horizontal or slant asymptote. To sketch graph on our calculator
we use the change of base formula. Input $y = \ln(x - 3)/\ln(4)$, [6:standard]. Draw
a dotted line for the vertical asymptote and make sure that you show the graph
approaching the vertical asymptote and going to $-\infty$.
6. (a) -2 , (b) $2/3$, (c) 3 , (d) 1.43 (rounded to two decimals.)
7. (a) $\frac{1}{2} \ln y - 5 \ln z$, (b) $\ln(x^5 y^2 / z^4)$.
8. (a) $\ln 31/3 \approx 2.335$, (b) $e^6/3 \approx 134.476$.
9. 5.78 years.
10. $(x, y) = (-1.79, -1.97), (2.40, -.36)$.
11. $(x, y) = (5, 1)$
12. $6\frac{2}{3}$ gallons 20%, $3\frac{1}{3}$ gallons 50%.
13. (1,2,3). On the TI-83 type [MATRX], [EDIT], [Enter], 3 (for 3 rows),
[Enter], 4 (for 4 columns), [Enter], 1, [Enter], 2 [Enter], -1, [Enter], 0, [Enter], etc.
(continue inputting the next two rows), [2nd] [Quit], [Clear], [MATRX], [MATH]
(scroll down) [RREF], [Enter], (Now input matrix [A] by typing) [MATRX], 1,),
[Enter] and you should see the matrix in RREF form appear, with 1,2,3 in the
fourth column.
14. $(1, 0), (5, 2)$.
15. $\begin{bmatrix} 1 & 0 & -2 \\ 0 & 1 & 3 \end{bmatrix}$
16. $x + 3y - z = 1, y + 2z = 5, z = 2$. Solution: $(x, y, z) = (0, 1, 2)$.