12. Divide the polynomials using synthetic division (Sec. 5.4)

$(x^3 + 5x^2 - x - 5) \div (x + 5)$

$$\begin{array}{r|rrrr} -5 & 1 & 5 & -1 & -5 \\ & & -5 & 0 & 5 \\ \hline & 1 & 0 & -1 & 0 \end{array}$$

$x^2 + 0x - 1$ rem

$x^2 - 1$

13. Simplify. Rationalize denominator if necessary. (Sec. 6.2)

a. $\sqrt{8x^2} \times \sqrt{2x^2}$

$\sqrt{16x^4}$

$4x^2$

b. $\dfrac{\sqrt[3]{5}}{\sqrt[3]{3x^2y}} \cdot \dfrac{\sqrt[3]{3^2xy^2}}{\sqrt[3]{3^2xy^2}} = \dfrac{\sqrt[3]{5 \cdot 3^2xy^2}}{\sqrt[3]{3^3x^3y^3}}$

$= \dfrac{\sqrt[3]{45xy^2}}{3xy}$

14. Solve. Check for extraneous solutions. (Sec. 6.5)

$2 + \sqrt{x+5} = 4$

$\sqrt{x+5} = 2$

$x + 5 = 4$

$x = -1$

Check

$2 + \sqrt{-1+5} = 4$

$2 + \sqrt{4} = 4$

$2 + 2 = 4$

✓ good

15. Let f(x) = x – 4 and g(x) = x^2 – 16. (Sec. 6.6)

a. Find $(f \circ g)(7)$.

① $g(7) = 7^2 - 16$
$= 49 - 16$
$= 33$

② $f(33) = 33 - 4$
$= 29$

$fog(7) = 29$

b. Find $(g \circ f)(x)$.

$(x-4)^2 - 16$

$x^2 - 8x + 16 - 16$

$x^2 - 8x$

16. Find the inverse of the function. Determine if the inverse is a function or not. (Sec. 6.7)

$f(x) = \sqrt{x - 10}$

y

$x = \sqrt{y - 10}$

$x^2 = y - 10$

$x^2 + 10 = y$

this is a function

17. If $3000 is invested into an account that compounds continuously at 2.8%, how much will be in the account after 2 years? (Sec. 7.2)

$A = 3000e^{.028(2)}$

$A = \$3,172.79$

18. The population of the town of Logville increases by 1.3% each year. If the current population is 16,000 people, in how many years will the population reach 22,000 people? (Sec. 7.5)

$22{,}000 = 16{,}000(1.013)^x$

$1.375 = 1.013^x$

$\log 1.375 = \log 1.013^x$

$\frac{\log 1.375}{\log 1.013} = x$

$x = 24.7$ yrs

19. Solve for x: $\log_2 4x = 5$ (Sec. 7.5) Hint… B.O.M.

$2^5 = 4x$

$32 = 4x$

$8 = x$

20. Solve. Round to the nearest hundredth. $\ln 4 - \ln x = 2$ (Sec. 7.6)

$\ln \frac{4}{x} = 2$

$e^2 = \frac{4}{x}$

$7.389 = \frac{4}{x}$

$.54 = x$

21. Write an equation for the translation of $y = \frac{1}{x}$ with asymptotes x = 3 and y = 6. (Sec. 8.2)

$y = \frac{1}{x-3} + 6$

↓ horizontal shift → vertical shift

22. Simplify and state any restrictions. (Sec. 8.4)

$\frac{x^2+x-6}{x-5} \times \frac{x^2-25}{x^2+4x+3}$

$\frac{(x+3)(x-2)}{x-5} \cdot \frac{(x-5)(x+5)}{(x+3)(x+1)} = \frac{(x-2)(x+5)}{(x+1)}$

restrictions $x \neq 5, -3, -1$