

Review Problems

Please note that Quiz 8 will also cover topics covered on Quizzes 1-7 and Exams 1 and 2. Please review those topics as well, even if they do not appear on this document.

1. Divide the polynomials as indicated.

a) $x^4 - 5x^2 + 1$ by $x^2 - x + 2$

c) $32x^5 - 1$ by $2x - 1$

b) $2x - 7$ by $x + 4$

d) $x^4 - 4x^3 + 1$ by $x^2 - x + 3$.

2. What is the remainder we get when we perform the following divisions? (You do NOT have to actually divide.)

a) $x^4 - 3x^3 + 5x^2 - 8x + 5$ by $x + 1$

b) $3x^4 - 2x^3 + x - 2$ by $x - 1$

c) $x^6 - x + 1$ by $x - 2$

3. Solve each of the following inequalities.

a) $\frac{2x + 3}{5x - 1} \geq \frac{3}{8}$

b) $\frac{x + 8}{2x - 7} > 1$

c) $2x - 3x^2 \geq \frac{1}{3}$

4. Simplify each of the following expressions.

a) $\log_{10} 0.01 + \log_8 \left(\frac{1}{2}\right) - \ln \left(\frac{1}{e^5}\right)$

d) $\log_3 (x^2 - 1) - \log_3 (x - 1)$

g) $2 \log_5 \sqrt{a}$

b) $\log_6 1 + \log_6 2 + \log_6 3$

e) $\frac{1}{2} \ln (10^{10})$

h) $e^{\ln 7}$

c) $\log_6 (12a^3) + \log_6 (3a^5)$

f) $\log_2 (\log_2 (x^{32}))$

i) $e^{-2 \ln 3}$

5. Suppose that $\log_3 2 = x$. Express each of the following in terms of x .

a) $\log_3 6$

b) $\log_3 24$

c) $\log_2 3$

d) $\log_6 48$

6. Solve each of the following equations.

a) $\ln (x^2 - 1) = -1$

d) $\log_2 (2a - 3) - \log_2 (a + 6) = -3$

g) $3^{5x+1} = 32$

b) $\log_2 (x + 1) + \log_2 (x + 5) = 5$

e) $\log_5 (2m + 5) - \log_5 (7m - 4) = -2$

h) $2^{2x-3} = 5^{3-x}$

c) $\log_2 (1 - x) + \log_2 (-6 - 2x) = 6$

f) $2^{2x-3} = 32$

i) $2^{x+1} - 5 \cdot 2^{x-1} = -3$

7. Find the domain of each of the following functions.

a) $f(x) = \frac{1}{\log_2 (x - 10)}$

c) $p(x) = \ln (x + 3) + \ln (x - 3)$

e) $f(x) = \log_9 (6 - x^2 + 2x)$

b) $m(x) = \ln (x^2 - 9)$

d) $q(x) = \frac{\ln (x + 3)}{\ln (x - 3)}$

8. We place \$3000 into a bank account with an annual compound interest rate of 7%, compounded annually. How long does it take for the money to double in the account?

9. If we take Q amount of a certain medication, the amount of it in our system, t hours after intake is

$$A(t) = Q \left(\frac{3}{4}\right)^{0.8t}$$

a) Approximately what percent of the medication is in our system 2 hours after taking it?

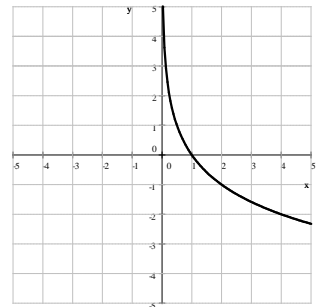
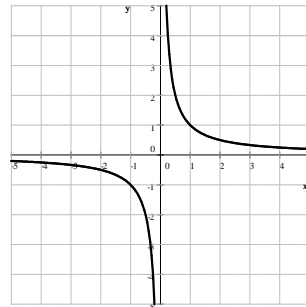
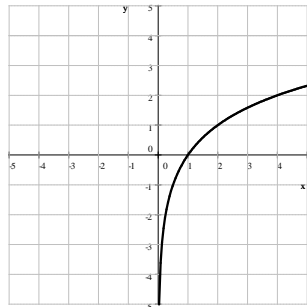
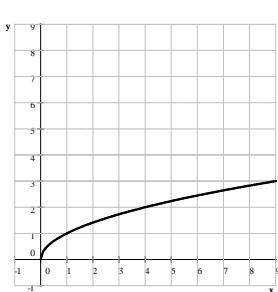
b) How long until we have only 20% left in our system?

c) How long until we have only 1% left in our system?

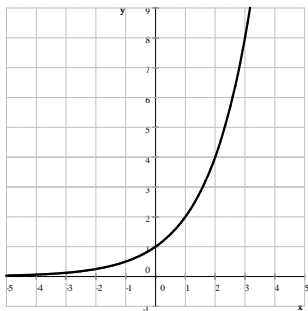
10. The number of cells in a sample at time t (measured in hours) is $N(t) = 20\,000(1.2^{0.5t})$. How long will it take for the sample to double?
11. Graph each of the following.
- a) $f(x) = \sqrt{x}$ b) $f(x) = \log_2 x$ c) $f(x) = \frac{1}{x}$ d) $f(x) = \log_{1/2} x$
- e) $f(x) = 2^x$ f) $f(x) = \left(\frac{1}{2}\right)^x$ g) $f(x) = \frac{1}{x^2}$ h) $f(x) = |x|$

Review Problems - Answers

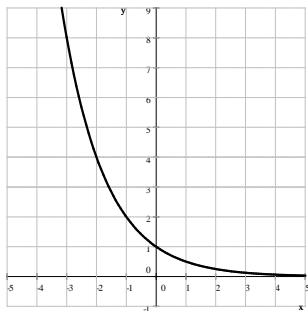
1. a) $x^2 + x - 6$ R $-8x + 13$ b) 2 R -15 c) $16x^4 + 8x^3 + 4x^2 + 2x + 1$ d) $x^2 - 3x - 6$ R $3x + 19$
2. a) 22 b) 0 c) 63
3. a) $(-\infty, -27] \cup \left(\frac{1}{5}, \infty\right)$ b) $\left(\frac{7}{2}, 15\right)$ c) $\frac{1}{3}$
4. a) $\frac{8}{3}$ b) 1 c) $2 + 8 \log_6 a$ d) $\log_3(x+1)$ e) $5 \ln 10$ f) $5 + \log_2(\log_2 x)$ g) $\log_5 a$
h) 7 i) $\frac{1}{9}$
5. a) $x+1$ b) $3x+1$ c) $\frac{1}{x}$ d) $\frac{4x+1}{x+1}$
6. a) $-\sqrt{\frac{1}{e}+1}, \sqrt{\frac{1}{e}+1}$ b) 3 c) -7 d) 2 e) no solution f) 4
g) $\frac{1}{5}(-1 + \log_3 32) = \log_{243} \left(\frac{32}{3}\right)$ h) $3 \log_{20} 10$ i) $\log_2 6$ j) 1
7. a) $x > 10$ but $x \neq 11$ b) $x < -3$ or $x > 3$ c) $x > 3$ d) $x > 3$ but $x \neq 4$ e) $1 - \sqrt{7} < x < 1 + \sqrt{7}$
8. $t = \frac{\ln 2}{\ln 1.07} \approx 10.244\,768\,351\,058\,7$ - a little bit more than 10 years
9. a) 63.11% b) 6.99 hours c) 20 hours
10. 7.604 hours
11. a) $f(x) = \sqrt{x}$ b) $f(x) = \log_2 x$ c) $f(x) = \frac{1}{x}$ d) $f(x) = \log_{1/2} x$



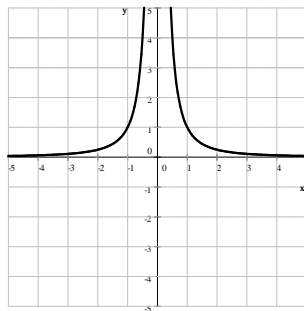
e) $f(x) = 2^x$



f) $f(x) = \left(\frac{1}{2}\right)^x$



g) $f(x) = \frac{1}{x^2}$



h) $f(x) = |x|$

