

FINAL REVIEW EXERCISES

Note: These problems address major concepts in Math 070, but do not comprise all possible problems/concepts covered on the final exam.

1. **Find the domain of each function. Express your answer using interval notation.**

a) $f(x) = 7x + 3$

b) $f(x) = \sqrt{6 - 2x}$

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

d) $f(x) = 2^{x-8}$

e) $h(x) = \log_2(x-5)$

f) $f(x) = 4x^2 - 2x + 3$

2. **Let $f(x) = -2x^2 + 3x$, $g(x) = \frac{2}{x-5}$, $h(x) = \frac{2x}{x+1}$ and $k(x) = 2x - 3$.**

Find the given new functions and completely simplify your answers.

a) $(f \circ g)(x)$

b) $g(f(-2))$

c) $h(k(x))$

3. **Find the inverse the given functions.**

a) $f(x) = 4x - 5$

b) $f(x) = \sqrt[3]{x-2}$

c) $h(x) = \frac{3x}{x+2}$

4. a) **Stuart has 1000 yd of fencing and wishes to enclose a rectangular area.**

What are the dimensions of the rectangle that will maximize the enclosed area?
What is the maximum area that can be enclosed by the fence?

b) **A farmer uses 1200ft of fence to enclose three sides of a rectangular region.**

What are the dimensions of the rectangle that will maximize the enclosed area?
What is the maximum area that can be enclosed by the fence?

c) **The larger of two numbers is 8 more than twice the smaller number.**

Find the numbers such that their product is a minimum.

5. **Simplify the radical expressions and assume that the variables represent real numbers. Use absolute values when necessary.**

a) $\sqrt{16x^{12}y^{10}z^6}$

b) $\sqrt[3]{40x^4y^6}$

c) $\sqrt{243a^4b^9c^{13}}$

d) $\sqrt{\frac{9x^2}{16x^{-2}}}$

e) $\sqrt[4]{\frac{32}{y^5}}$

6. *Perform the indicated operations. Assume that the variables represent positive numbers.*

a) $2\sqrt[3]{3x^3} + 4x\sqrt[3]{81} - \sqrt[3]{24x^3}$ b) $\sqrt{27x^2} - x\sqrt{48} + 2\sqrt{75x^2} - x\sqrt{243}$

c) $(-125)^{\frac{2}{3}}$ d) $\frac{1+\sqrt{5}}{2-\sqrt{5}}$ e) $(\sqrt{3}+\sqrt{6})^2$

7. *Perform indicated operation and write the answer in a + bi form.*

a) $(3-2i)^2$ b) $(2+\sqrt{-16})(-1+\sqrt{-9})$ c) $\frac{3-2i}{5+2i}$

8. *Evaluate.*

a) $\log_8(-8)$ b) $\log_5 \frac{1}{125}$ c) $3^{\log_3 15 - \log_3 3}$
 d) $\ln e^{3x}$ e) $\log_{\sqrt{4}} 16$ f) $\log_2 \frac{1}{16}$ g) $\log_4 100 - \log_4 25$

9. *Write the expression as a sum and/or a difference of multiples of logarithms.*

a) $\ln\left(\frac{ex^2}{y\sqrt{z}}\right)$ b) $\log_2\left(\frac{\sqrt[3]{x}}{\frac{1}{y^2}}\right)^6$ c) $\log(100x^2z)$ d) $\log_5\left(\frac{yz}{125x^3}\right)$

10. *Write the expression as a single logarithm with coefficient 1.*

a) $\frac{1}{2}\log x - \log y + 3\log(x-3)$
 b) $\log_2(x^2 - 5x + 6) - \log_2(x^2 - 4) + \log_2(x+2)$
 c) $9\ln\sqrt[3]{x} + 8\ln\sqrt{x} - \ln x$

11. *Solve. Remember to check your answers for possible extraneous solutions, when necessary. Write your answer using set notation.*

a) $|x-4|+7=18$ b) $4|3-x|=4$
 c) $-5|x-2|=20$ d) $|x-3|=|2x-5|$
 e) $\sqrt{x+2}+\sqrt{x-1}=3$ f) $4\sqrt{x-5}+9=29$
 g) $x^2+4x-6=0$ h) $2^{x-2}=7^x$

11. *Solve. Remember to check your answers for possible extraneous solutions, when necessary. Write your answer using set notation.*

i) $\log(x+18) - \log 5 = \log(2x)$ j) $\log_2(x+1) + \log_2(x-1) = 3$

k) $\left(\frac{1}{4}\right)^{2x} \cdot 2^{6x} = 32$

12. *Solve using matrices (row operations). Write your answer as an ordered triple.*

$$\begin{cases} x + y + z = -2 \\ x + y - 2z = 1 \\ 4x + 2y + 3z = -15 \end{cases}$$

13. *Use Cramer's Rule (determinants) to solve the system. Write your answer as an ordered pair.*

$$\begin{cases} x - y = -2 \\ 5x + 3y = -8 \end{cases}$$

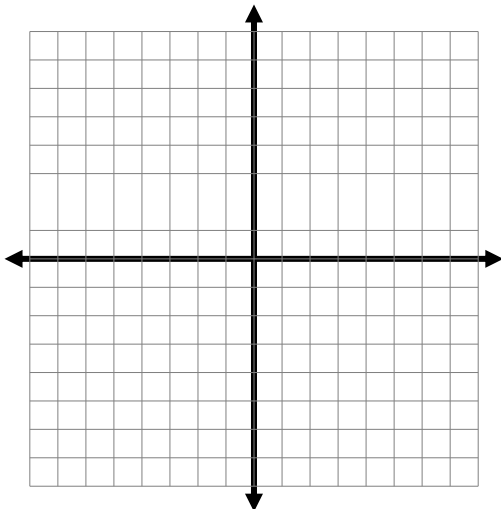
14. *Solve the inequalities and write your solution set using interval notation:*

a) $x - 9 > -2x$ or $-2x \geq 6$ b) $2|x - 5| \geq 10$

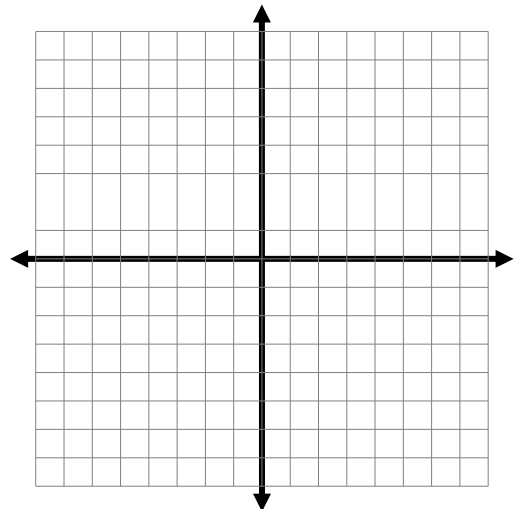
c) $-2|2x + 1| \geq -4$ d) $x^2 + 3x - 10 > 0$

e) $\frac{x - 5}{x + 2} \geq 0$ f) $x^2 + 6x + 9 \leq 0$

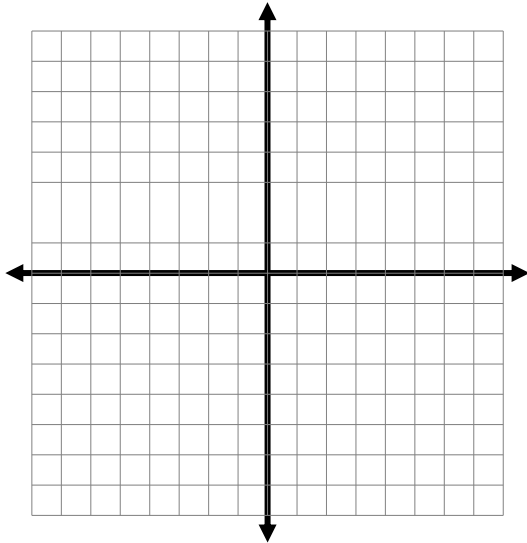
15. *Graph $f(x) = \sqrt{x-2} + 1$ and state the domain and the range of the function.*



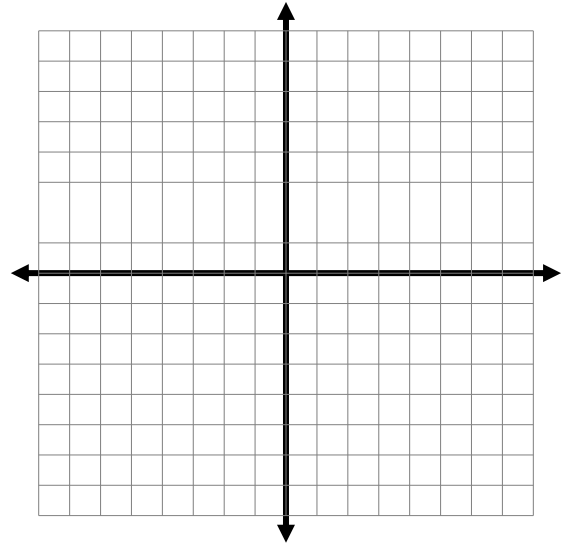
16. *Graph $g(x) = |x - 4|$ and state the domain and the range of the function.*



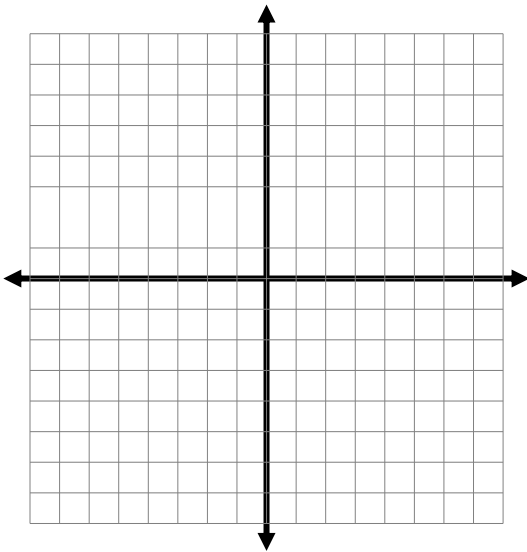
17. Graph $h(x) = x^2 + 4x + 3$ and state the domain and the range of the function.



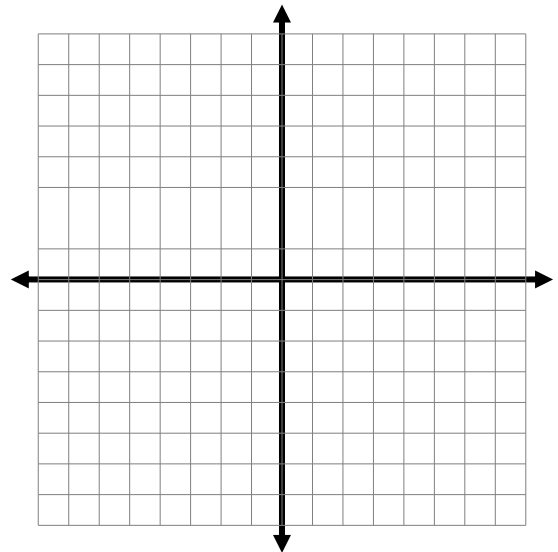
18. Graph $k(x) = \left(\frac{1}{3}\right)^x$ and state the domain and the range of the function.



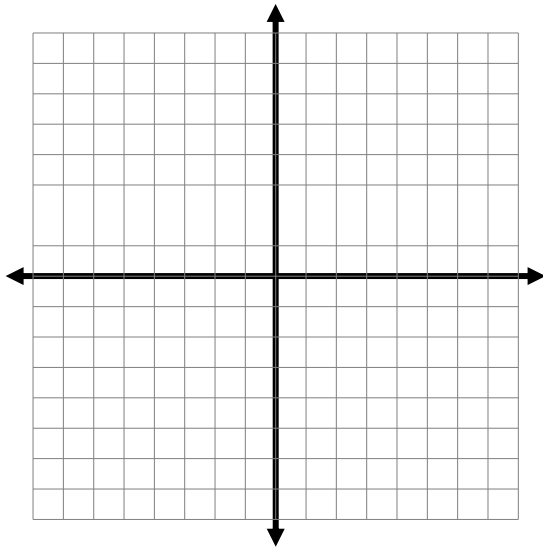
19. Graph $f(x) = \log_2 x$ and state the domain and the range of the function.



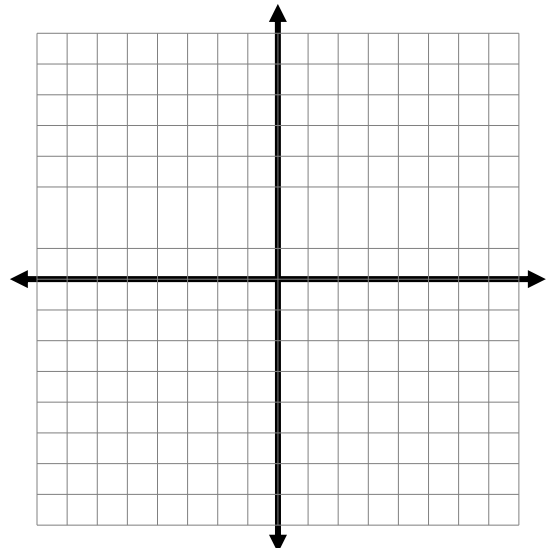
20. Graph $9(x-1)^2 - 25(y+2)^2 = 225$



21. Graph $x^2 - 4x + y^2 + 6y + 4 = 0$



22. Graph $16x^2 - 9y^2 = 144$ and write the equations of the asymptotes.



Sequences and Series

23. Write a formula for the n th term (a_n) of the sequence:

a) 17, 11, 5, -1, ...

b) $-\frac{1}{2}, \frac{2}{3}, -\frac{3}{4}, \frac{4}{5}, \dots$

c) $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \dots$

d) 2, -4, 8, -16, 32, -64, ...

24. Write the given series in summation notation.

a) $1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \frac{1}{36}$

b) $1 - 8 + 27 - 64 + 125$

c) $30 + 26 + 22 + 18 + 14 + 10$

d) $\frac{1}{1} - \frac{2}{3} + \frac{4}{9} - \frac{8}{27} + \frac{16}{81} - \frac{32}{243}$