Intermediate Algebra **Practice Final**
Math 80 (7th ed.) **(Ch. 2-6)**

(2.5)

1. Solve the following compound inequality and graph the solution set.

a) $x \le 0$ *and* $x \ge -2$

b) $x \ge -4$ *and* $x > 1$

c) $x \ge -3$ *or* $x \le -4$

d) $x \ge -2$ *or* $x \le 2$

(2.7)

2. Solve the following absolute value inequalities. Write your answer in *interval notation*.

a) $|x-6|+4 \le 9$

b) $|x-6|+4 > 9$

c) $|x-6|+4 < 3$

d) $|x-6|+4 \ge 3$

(3.5)

3. Find the equation of the line satisfying the given conditions.
Write your answer in the form: $y = mx + b$

a) slope 3; through $(-4, 2)$

b) through $(8, -3)$ *and* $(4, -8)$

c) undefined slope; through $(10, -8)$

d) zero slope; through $(10, -8)$

(3.3, 8.6)

4. Find the intercepts of the following equations.

a) $y = x^2 - 2x - 35$

***x*-intercept:** _____

***y*-intercept:** _____

b) $7x + 5y = 21$

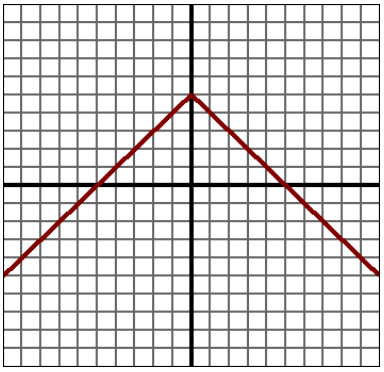
***x*-intercept:** _____

***y*-intercept:** _____

(3.2)

5. Find the domain and range of the following relations.*

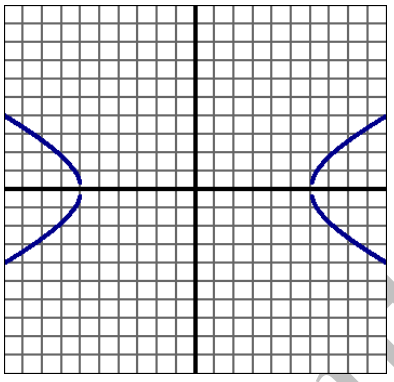
a)



domain: _____

range: _____

b)



domain: _____

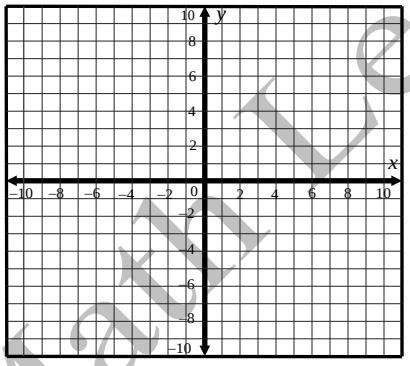
range: _____

***You should practice more problems like these!** Look in your e-text/textbook. See example 6 on pages 136-137 and work problems 29-40 on page 144.

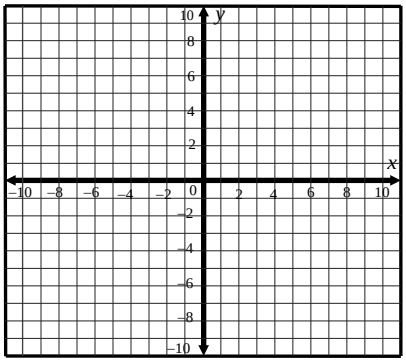
(3.6)

6. Graph the piecewise function:

a) $f(x)=\begin{cases}-4x-2 & if \quad x<0\\ x+1 & if \quad x\geq 0\end{cases}$



b) $g(x)=\begin{cases}-4x-2 & if \quad x\geq -3\\ x+1 & if \quad x<-3\end{cases}$



(4.1)

7. Solve the following system of equations.

a) $\begin{aligned}3x+2y&=3\\6x-4y&=2\end{aligned}$

b) $\begin{aligned}3x+6y&=15\\2x+4y&=3\end{aligned}$

c) $\begin{aligned}x+4y&=19\\3x+2y&=17\end{aligned}$

d) $\begin{aligned}x-3y&=-1\\2x-6y&=-2\end{aligned}$

(5.1, 5.2)

8. Simplify. Write your answer using positive exponents only.

a) $\dfrac{27x^2y^{-5}}{81xy^{-3}}$

b) $\dfrac{-2x^5\left(y^3\right)^{-3}}{x^9y^{-3}}$

c) $\dfrac{7^{-1}a^{-3}b^5}{a^2b^{-2}}$

d) $\left(\dfrac{9y^{-4}}{z^{-3}}\right)^{-2}$

(5.7)

9. Factor the following polynomials completely.

a) $20x^2+23x+6$

b) $6x^2+x-15$

c) $25x^2-40x+16$

(6.1, 6.2)

10. Perform the indicated operations. Simplify if possible.

a) $\dfrac{x^2+6x+9}{4x^2+10x+6}\cdot\dfrac{2x^2+3x}{x+3}$

b) $\dfrac{x+1}{x^2+3x+2}\div\dfrac{x-1}{x^2+4x+4}$

c) $\dfrac{5}{x^2-4}-\dfrac{3}{x^2+4x+4}$

d) $\dfrac{5}{x^2-4}+\dfrac{3}{x^2+4x+4}$

(6.3)

11. Simplify the following complex fractions.

a) $\dfrac{\dfrac{x+1}{x^2-4}}{\dfrac{x+1}{x+2}-1}$

b) $\dfrac{\dfrac{3}{2x-3}+1}{\dfrac{1}{2x-3}+1}$

(7.3)

12. Simplify. Assume all variables represent positive real numbers.

a) $\sqrt{32a^8b^7}$

b) $\sqrt[3]{125r^9s^{12}}$

c) $\sqrt[4]{32x^{12}y^5}$

(7.5)

13. Rationalize the denominator.

a) $\sqrt{\dfrac{2x}{5y}}$

b) $\dfrac{2}{\sqrt{2}+4}$

c) $\dfrac{-3}{\sqrt{6}-2}$

(5.8, 6.5, 7.6, 8.1, 8.2)
Solve the following equations.

14. $\dfrac{36}{x^2-9}+1=\dfrac{2x}{x+3}$

15. $x+8=\sqrt{4-3x}$

16. $3y^2+6y=4$

17. $3m^2-7m=3$

18. $6x^2-3=3x$

19. $2x^2+3x=35$

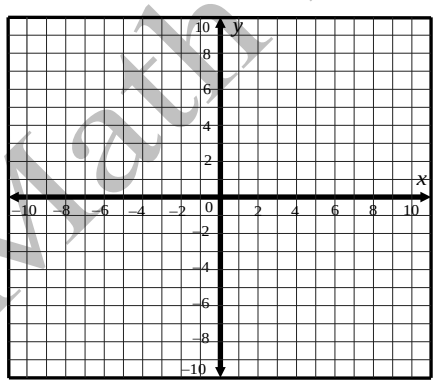
(8.5, 10.1)
20. Graph the following functions. Find the vertex and x and y intercepts if they exist.

a) $f(x)=(x-1)^2+2$

vertex: _____

***x*-intercept:** _____

***y*-intercept:** _____

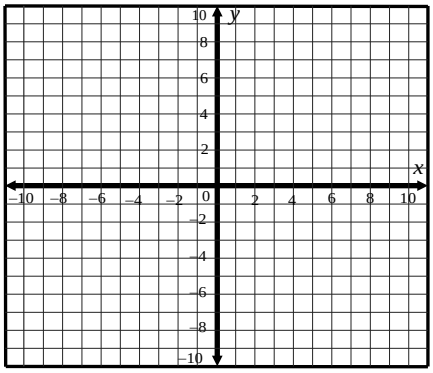


b) $f(x)=(x+2)^2-1$

vertex: _____

***x*-intercept:** _____

***y*-intercept:** _____

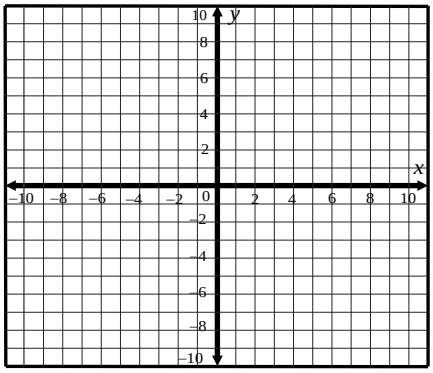


c) $f(x) = -(x+5)^2$

vertex: _____

***x*-intercept:** _____

***y*-intercept:** _____

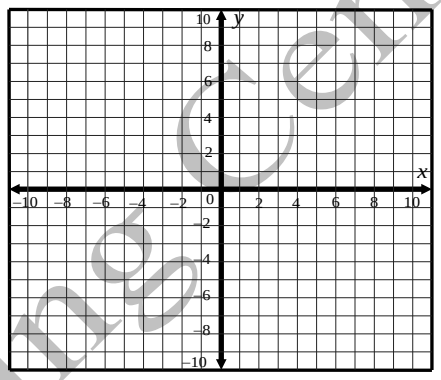


d) $f(x) = (x-6)^2 - 4$

vertex: _____

***x*-intercept:** _____

***y*-intercept:** _____



(8.4)

21. Solve the following nonlinear inequalities. Write the solution in *interval notation*.

a) $(2x-7)(x+1) > 0$

b) $(2x-7)(x+1) < 0$

c) $\dfrac{x+4}{x-10} < 0$

d) $\dfrac{x+4}{x-10} > 0$

(9.1)

22. a) For the functions, $f(x) = x^2$ and $g(x) = 2x+1$, find $(f \circ g)(3)$ and $(g \circ f)(3)$.

b) For the functions, $f(x) = 4x-1$ and $g(x) = x^3$, find $(f \circ g)(2)$ and $(g \circ f)(2)$.

(9.2)

23. Find the inverse of the following one-to-one functions.

a) $f(x) = 3x - 5$

b) $f(x) = \dfrac{3x-4}{7}$

c) $f(x) = (x+5)^3$

d) $f(x) = \sqrt[3]{x-7}$

(9.2)

24. Write the following expression as a sum or difference of logarithms.

a) $\log_7\left(x^5 yz^3\right)$

b) $\log_7\left(\dfrac{x^5}{yz^3}\right)$

(9.3, 9.8)

Solve the following equations. Give an exact solution.

25. a) $9^{2x+1} = 81$

b) $25 = 125^{x-2}$

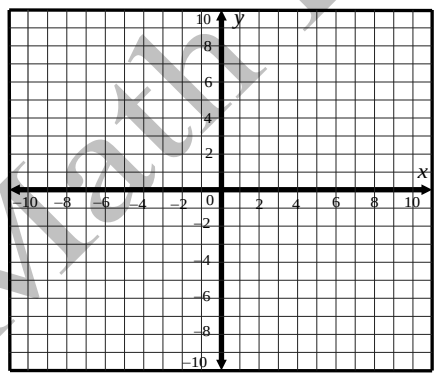
26. a) $\log_6 x + \log_6(x+1) = 1$

b) $\log(x-1) - \log x = 1$

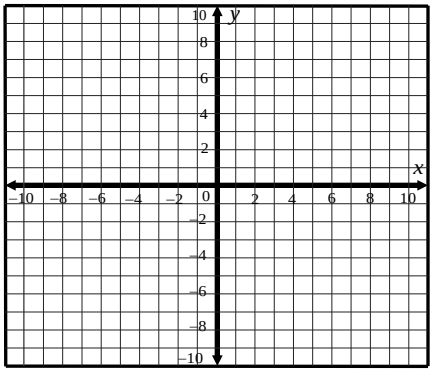
(3.7)

27. Graph the following inequalities.

a) $x - 6y < 12$



b) $4y + x \le 8$

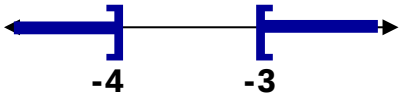


ANSWERS:

1. a) $[-2,0]$ or $\{x \mid -2 \le x \le 0\}$

b) $(1,\infty)$ or $\{x \mid x > 1\}$

c) $(-\infty,-4] \cup [-3,\infty)$ or $\{x \mid x \ge -4 \text{ or } x \le -3\}$



d) $(-\infty,\infty)$ or $\{x \mid x \text{ is a real number}\}$

2. a) $[1,11]$ b) $(-\infty,1) \cup (11,\infty)$

c) $\varnothing$ d) $(-\infty,\infty)$

3. a) $y = 3x + 14$ b) $y = \frac{5}{4}x - 13$

c) $x = 10$ d) $y = -8$

4. a) ***x*-intercept:** $(-5,0)$ *and* $(7,0)$

***y*-intercept:** $(0,-35)$

b) ***x*-intercept:** $(3,0)$

***y*-intercept:** $\left(0,\frac{21}{5}\right)$

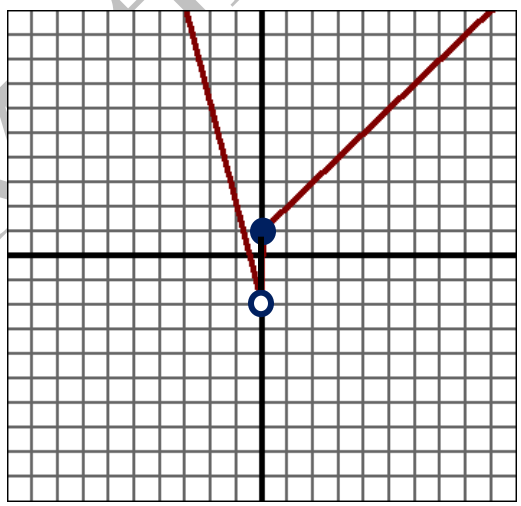
5. a) **domain:** $(-\infty,\infty)$

range: $(-\infty,5]$

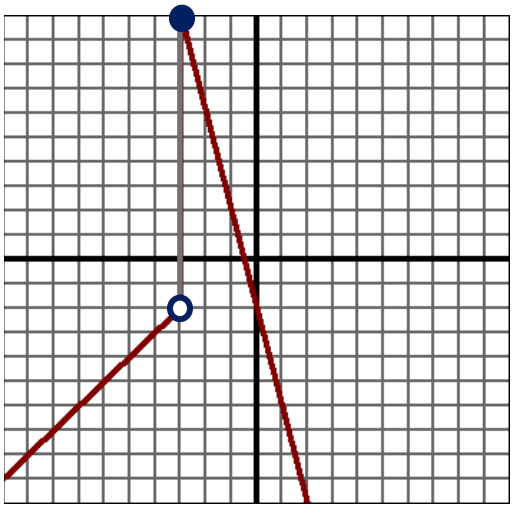
b) **domain:** $(-\infty,-6] \cup [6,\infty)$

range: $(-\infty,\infty)$

6. a)



b)



7. a) $\left(\frac{2}{3},\frac{1}{2}\right)$ b) $\varnothing$

c) $(3,4)$ d) $\{(x,y) \mid x-3y=-1\}$

8. a) $\frac{x}{3y^2}$ b) $\frac{-2}{x^4y^6}$

c) $\frac{b^7}{7a^5}$ d) $\frac{y^8}{81z^6}$

9. a) $(4x+3)(5x+2)$ b) $(2x-3)(3x+5)$ c) $(5x-4)^2$

10. a) $\frac{x(x+3)}{2(x+1)}$ b) $\frac{x+2}{x-1}$

c) $\frac{2(x+8)}{(x+2)^2(x-2)}$ d) $\frac{4(2x+1)}{(x+2)^2(x-2)}$

11. a) $-\frac{x+1}{x-2}$ or $\frac{x+1}{2-x}$ b) $\frac{x}{x-1}$

12. a) $4a^4b^3\sqrt{2b}$ b) $5r^3s^4$ c) $2x^3y\sqrt[4]{2y}$

13. a) $\frac{\sqrt{10xy}}{5y}$ b) $-\frac{\sqrt{2}-4}{7}$ or $\frac{4-\sqrt{2}}{7}$ c) $\frac{-3(\sqrt{6}+2)}{2}$ *or* $\frac{-3\sqrt{6}-6}{2}$

14. $x=9$
(<u>note</u>: $x=-3$ does not check)

15. $x=-4$
(<u>note</u>: $x=-15$ does not check)

16. $y=\frac{-3\pm\sqrt{21}}{3}$

17. $m=\frac{7\pm\sqrt{85}}{6}$

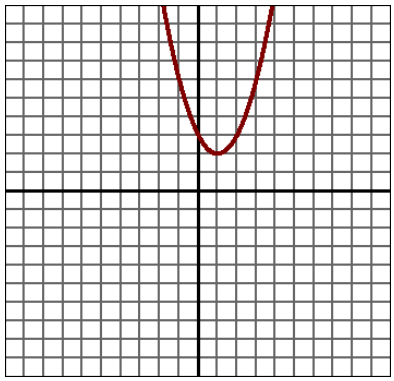
18. $x=-\frac{1}{2}$ *or* $x=1$

19. $x=-5$ *or* $x=\frac{7}{2}$

20. a) **vertex:** $(1,2)$

x-intercept: *none*

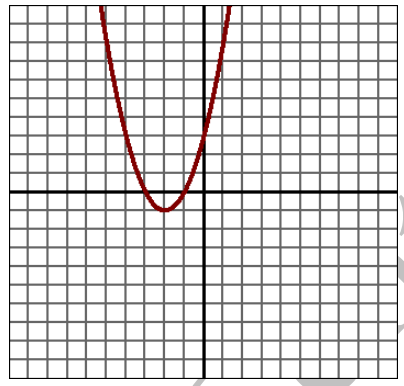
y-intercept: $(0,3)$



b) **vertex:** $(-2,-1)$

x-intercept: $(-3,0)$ *and* $(-1,0)$

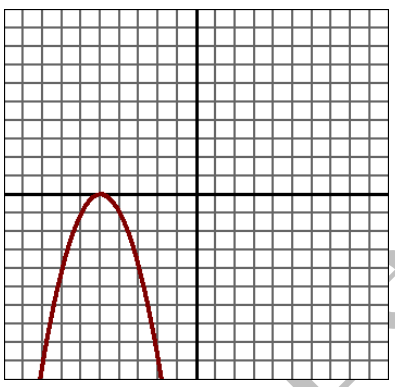
y-intercept: $(0,3)$



c) **vertex:** $(-5,0)$

x-intercept: $(-5,0)$

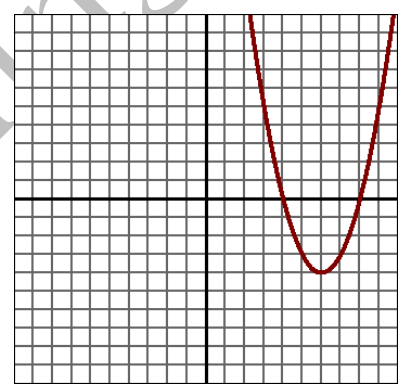
y-intercept: $(0,-25)$



d) **vertex:** $(6,-4)$

x-intercept: $(4,0)$ *and* $(8,0)$

y-intercept: $(0,32)$



21. a) $(-\infty,-1)\cup\left(\frac{7}{2},\infty\right)$

b) $\left(-1,\frac{7}{2}\right)$

c) $(-4,10)$

d) $(-\infty,-4)\cup(10,\infty)$

22. a) $(f\circ g)(3)=49$
$(g\circ f)(3)=19$

b) $(f\circ g)(2)=31$
$(g\circ f)(2)=343$

23. a) $f^{-1}(x)=\frac{x+5}{3}$

b) $f^{-1}(x)=\frac{7x+4}{3}$

c) $f^{-1}(x)=\sqrt[3]{x}-5$

d) $f^{-1}(x)=x^3+7$

24. a) $5\log_7 x + \log_7 y + 3\log_7 z$

b) $5\log_7 x - \log_7 y - 3\log_7 z$

25. a) $x = \frac{1}{2}$

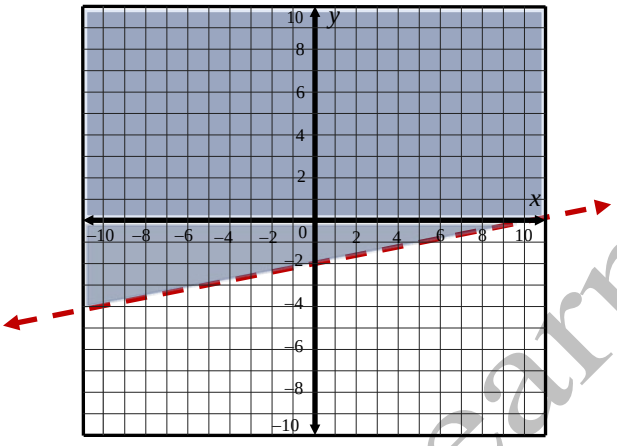
b) $x = \frac{8}{3}$

26. a) $x = 2$
(<u>note</u>: $x = -3$ does not check)

b) *no solution*
(<u>note</u>: $x = -\frac{1}{9}$ does not check)

27. Graph the following inequalities.

a) $x - 6y < 12$



b) $4y + x \le 8$