## Intermediate Algebra <br> Math 80 ( $7^{\text {th }}$ ed.)

## Practice Midterm

(Ch. 2-6)
(2.2)

1. Write as an algebraic expression and simplify completely.
a) The perimeter of a rectangle with length $7 x$ and width $2 x-8$.
b) The perimeter of a triangle with sides of length $x, x-2$, and $3 x-8$.
(2.3)
2. Find the amount of money in an account after 3 years if a principal of $\$ 7000$ was invested at $6 \%$ interest compounded
a) semiannually
b) quarterly
c) monthly

Use: $A=P\left(1+\frac{r}{n}\right)^{n t}$ Round to the nearest cent.
(2.6)
3. Solve the following equations.
a) $|5 x-6|=-4$
b) $|4 x-3|=11$
(2.7)
4. Solve the following inequalities. Write your answer in interval notation.
a) $|x-6|+4 \leq 9$
b) $|x-6|+4>9$
c) $|x-6|+4<3$
d) $|x-6|+4 \geq 3$
(3.3)
5. Find the intercepts and graph the following equations.
a) $5 x+3 y=15$
b) $4 x-2 y=8$
$x$-intercept $\qquad$ $x$-intercept $\qquad$
$y$-intercept $\qquad$

(3.5)
6. Find the equation of the line satisfying the given conditions. Then find the $x$ and $y$-intercepts Write your answer in the form: $y=m x+b$
a) A line with slope parallel to the line $2 x-3 y=3$ and passing through the point $(6,-1)$.
b) A line with slope perpendicular to the line $y=\frac{1}{2} x+4$ and passing through the point $(1,2)$.
(3.2)
7. Determine whether the graph is the graph of a function and state the domain and range.*
a)


Domain $\qquad$
Range $\qquad$
Function? $\qquad$

b)


Domain $\qquad$
Range $\qquad$
Function? $\qquad$
*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.
(3.5)
8. Graph the function $f(x)=-\frac{5}{2} x+4$.

(3.6)
9. Graph the piecewise function:
a) $f(x)=\left\{\begin{array}{lll}-4 x-2 & \text { if } & x<0 \\ x+1 & \text { if } & x \geq 0\end{array}\right.$
b) $g(x)=\left\{\begin{array}{lll}-4 x-2 & \text { if } & x \geq-3 \\ x+1 & \text { if } & x<-3\end{array}\right.$


(4.1)
10. Solve the following system of equations.
a) $\begin{array}{r}3 x+2 y=3 \\ 6 x-4 y=2\end{array}$
$6 x-4 y=2$
b) $\begin{aligned} & x+4 y=19 \\ & 3 x+2 y=17\end{aligned}$
(4.2)
11. Use a system of equations to solve the following problems.
a) Victor bought some large picture frames for $\$ 15$ each and some small picture frames for $\$ 8$ each at a closeout sale. If he bought a total of 22 frames for $\$ 239$, find how many of each type he bought.
b) The Sage Hill Drama department sold 311 tickets for a play. Student tickets cost 50 cents each; non-student tickets cost $\$ 1.50$. If the total receipts were $\$ 385.50$, find how many of each type were sold.

## (5.2, 6.3)

12. Simplify. Write your answer using positive exponents only.
a) $\frac{27 x^{2} y^{-5}}{81 x y^{-3}}$
b) $\frac{x^{-2}+x^{-3}}{5+x^{-2}}$
(5.4)
13. Multiply the following polynomials.
a) $(2 a-5)^{2}$
b) $(2 a-5)(2 a+5)$
c) $(6 q-7)\left(2 q^{2}+2 q-3\right)$
(5.7)
14. Factor the following polynomials.
a) $25 x^{4}+20 x^{3}+15 x^{2}$
b) $6 x^{2}+x-15$
c) $176 t-16 t^{2}$
(5.8)
15. A rocket is launched from the ground. The height, $h$, of the rocket at time $t$ seconds is given by the equation $h(t)=48 t-16 t^{2}$.
a) Find how long it will take the rocket to return to the ground.
b) Determine how long it take the rock to reach a height 36 feet.
(6.3)
16. Simplify the following complex fractions.
a) $\frac{\frac{x+1}{x^{2}-4}}{\frac{x+1}{x+2}-1}$

$$
\text { b) } \frac{\frac{x+6}{x^{2}-36}}{5+\frac{1}{x-6}}
$$

(6.4)
17. Use long division to divide. $\left(3 x^{3}-2 x^{2}-19 x-6\right) \div(3 x+1)$
18. Use synthetic division to divide. $\left(x^{4}+3 x^{3}-5 x+4\right) \div(x+1)$

## (6.5)

19. Solvé.
a) $\frac{36}{x^{2}-9}+1=\frac{2 x}{x+3}$
b) $\frac{x^{2}-20}{x^{2}-7 x+12}=\frac{3}{x-3}+\frac{5}{x-4}$
(5.8)
20. The length of a rectangular swimming pool is 10 meters greater than the width. If the area of the pool is 231 square meters, find the dimensions of the pool.

## (6.1, 6.2)

Perform the indicated operations. Simplify if possible.
21. a) $\frac{x^{2}+6 x+9}{4 x^{2}+10 x+6} \cdot \frac{2 x^{2}+3 x}{x+3}$
b) $\frac{x+1}{x^{2}+3 x+2} \div \frac{x-1}{x^{2}+4 x+4}$
22. a) $\frac{5}{x^{2}-4}-\frac{3}{x^{2}+4 x+4}$
b) $\frac{6}{x-5}+\frac{x-35}{x^{2}-5 x}-\frac{2}{x}$

## Answers:

1. a) $18 x-16$
b) $5 x-10$
2. a) $\$ 8358.37$
b) $\$ 8369.33$
c) $\$ 8376.76$
3. a) no solution
b) $\left\{-2, \frac{7}{2}\right\}$
4. a) $[1,11]$
c) no solution
b) $(-\infty, 1) \cup(11, \infty)$
d) $(-\infty, \infty)$
5. a) $x$-intercept: $(3,0)$
b) $x$-intercept: $(2,0)$
$y$-intercept: $(0,5)$

$y$-intercept: $(0,-4)$


5
6. a) $y=\frac{2}{3} x-5 ; x$-intercept: $\left(\frac{15}{2}, 0\right) ; y$-intercept: $(0,-5)$
b) $y=-2 x+4 ; x$-intercept: $(2,0) ; y$-intercept: $(0,4)$
7. a) Domain: $(-\infty, \infty)$

Range: $(-\infty, 5]$
Function? yes
b) Domain: $(-\infty,-6] \cup[6, \infty)$

Range: $(-\infty, \infty)$
Function? no
8.

9. a)

b)

10. a) $\left(\frac{2}{3}, \frac{1}{2}\right)$
b) $(3,4)$
11. a) $\mathbf{9}$ large frames and $\mathbf{1 3}$ small frames
b) 81 students and 230 non-students
12. a) $\frac{x}{3 y^{2}}$
b) $\frac{x+1}{x\left(5 x^{2}+1\right)}$
13. a) $4 a^{2}-20 a+25$
b) $4 a^{2}-25$
c) $12 q^{3}-2 q^{2}-32 q+21$ $16 t(11-t)$
14. a) $5 x^{2}\left(5 x^{2}+4 x+3\right)$
b) $(3 x+5)(2 x-3)$
c) $o r$ $-16 t(t-11)$
15. a) 3 seconds
b) 1.5 seconds
16. a) $-\frac{x+1}{x-2}$ or $\frac{x+1}{2-x}$
b) $\frac{1}{5 x-29}$
17. $x^{2}-x-6$
18. $x^{3}+2 x^{2}-2 x-3+\frac{7}{x+1}$
19. a) $\begin{aligned} & x=9 \\ & \text { note: } \\ & x=-3 \text { does not check }\end{aligned}$
b) $x=1$ or $x=7$
20. width: 11m; length: 21 m
21. a) $\frac{x(x+3)}{2(x+1)}$
b) $\frac{x+2}{x-1}$
22. a) $\frac{2(x+8)}{(x+2)^{2}(x-2)}$
b) $\frac{5}{x}$

