

Intermediate Algebra
Practice Final

Name _____

- Find all values of b for which $x^2 + bx - 20$ can be factored.
- An open box is made by cutting squares out of the corners of a piece of cardboard that is 15 inches by 30 inches. If the edge of each cut-out square is x inches,
 - Write an expression involving x , for the volume of the box.
 - What are the dimensions of the box with the maximum volume?
- $f(x) = 2x^2 + 3x$
Evaluate this function for the following input.

a) $f(t) =$	b) $f(t + 1) =$
c) $f(t) + 1 =$	d) $f(t + 1) - f(t) =$
e) $f(-x) =$	f) $-f(x) =$
g) $f(x + h) =$	h) $f(x + h) - f(x) =$
- Find the equation of the line that passes through the points $(7, 2)$ and $(-3, 14)$.
- Find the line perpendicular to the line containing the points $(2, 7)$ and $(-6, 5)$ that passes through the point $(4, 1)$.
- Solve the following inequalities. Show a number line analysis for each polynomial and rational inequality. Show a clear solution number line and write your solution in interval notation.

a) $3x + 7 \leq 5x - 2$	b) $(x - 4)(2x + 1)(x + 5) < 0$
c) $\frac{x^2 - 9}{x + 2} \leq 0$	d) $3x^2 - 10x - 8 \geq 0$
- Solve each of the following equations. Leave all solutions in exact form and in approximate form. Check each one with your calculator.

a) $\frac{5}{x^2 + 5x + 4} = \frac{2x}{x^2 - 1}$	b) $x^3 + 3x^2 = 4x$	c) $3x^2 - 4 = 2x$
d) $x^2 + 2x + 5 = 0$	e) $\sqrt{2x + 1} + x = 5$	

- Given the function $f(x) = 2x^2 + 5x$ and the function for g as shown in table form. Determine the values of the following, simplify the algebra where needed:

i) $g(f(-1))$	ii) $f(x + h)$
iii) $f(g(2))$	iv) $f(x + h) - f(x)$

x	g(x)
-4	13
-3	-20
-1	7
0	18
2	-5
4	8

9. For each of the following functions, simplify $\frac{f(x+h) - f(x)}{h}$
- a) $f(x) = 5x^2 + 4x - 7$ b) $f(x) = \frac{2x}{x+1}$
10. Factor the following.
- a) $3x^2 + 5x$ b) $x^4 - 16$
 b) $x^2 - 9x - 22$ d) $6x^2 + 13x - 5$
 e) $4x^3 - 12x^2 - 25x + 75$ f) $x^3 + 27$
11. Jeff can paint a house in 30 hours working alone. Susan can paint the same house in 35 hours working alone. How long will it take to paint the house if they work together?
12. Brett wants to make 1 ton of 15% protein ration for his sheep by mixing together soybean meal and whole corn. If soybean meal is 44% protein and whole corn is 8.5% protein, how many pounds of each will he use? (Hint: 1 ton = 2000 pounds)
13. Rabbits in a lab are to be kept on a strict daily diet to include 30 grams of protein, 16 grams of fat, and 24 grams of carbohydrates. The scientist has only three food mixes available with the following grams of nutrients per unit.
- | | Protein | Fat | Carbohydrates |
|--------------|---------|-----|---------------|
| Mix A | 4 | 6 | 3 |
| Mix B | 6 | 1 | 2 |
| Mix C | 4 | 1 | 12 |
- Find how many units of each mix are needed daily to meet one rabbit's dietary needs.
14. Simplify:
- a) $\sqrt{192x^3y^6}$ b) $\sqrt[5]{160x^7y^8}$
15. Simplify the following by hand. Explain the process you used.
- a) $27^{2/3}$ b) $16^{3/4}$
16. Add: $2\sqrt{27} + \sqrt{12} + 3\sqrt{75}$
17. If pipe A can fill a pool half as much time as it takes pipe B to fill the same pool. If it takes 8 hours to fill the pool using both pipes, how long does it take with each pipe alone?
18. Add, subtract, multiply, or divide as indicated.
- a) $\frac{3x+2}{x^2+3x-10} + \frac{5x}{x^2-25}$ b) $\frac{x-3}{x^2+5x-6} - \frac{x+1}{x^2-2x+1}$
 c) $\frac{x^2-3x-10}{x^2+5x+6} \cdot \frac{x^2+6x+9}{x^2-2x-15}$ d) $\frac{x^2+x}{x^2-1} \div \frac{3x}{x^2+4}$