

Practice Final – Math 135

1. Add or subtract as indicated

a.  $\frac{7}{4} + \frac{8}{5}$

$$\frac{7}{4} \cdot \frac{5}{5} + \frac{8}{5} \cdot \frac{4}{4}$$

$$\frac{35}{20} + \frac{32}{20} = \boxed{\frac{67}{20}}$$

b.  $\frac{1}{2} - \frac{1}{4} - \frac{1}{6}$

$$\frac{1}{2} \cdot \frac{6}{6} - \frac{1}{4} \cdot \frac{3}{3} - \frac{1}{6} \cdot \frac{2}{2}$$

$$\frac{6}{12} - \frac{3}{12} - \frac{2}{12} = \frac{6-3-2}{12}$$

$$= \boxed{\frac{1}{12}}$$

2. Find the value of each expression when  $x = 3$ . Reduce when possible.

a.  $3x^2 - 2x + 1$

$$3(3)^2 - 2(3) + 1$$

$$3(9) - 6 + 1$$

$$\underline{27} - 6 + 1$$

$$21 + 1 = \boxed{22}$$

b.  $\frac{x}{6} - \frac{3}{3x}$

$$\frac{3}{6} - \frac{3}{3(3)} = \frac{3}{6} - \frac{3}{9}$$

$$= \frac{1}{2} - \frac{1}{3} = \frac{1}{2} \cdot \frac{3}{3} - \frac{1}{3} \cdot \frac{2}{2} = \frac{3}{6} - \frac{2}{6}$$

$$= \boxed{\frac{1}{6}}$$

3. Use order of operations to simplify the expression.

a.  $10 - (-5) \times 3 + 8 \div 2 \times (-4)$

$$10 - \underline{(-5) \times 3} + 8 \div 2 \times (-4)$$

$$10 - (-15) + \underline{8 \div 2} \times (-4)$$

$$10 + 15 + 4 \times (-4)$$

$$10 + 15 + (-16)$$

$$25 - 16 = \boxed{9}$$

b.  $-4 - 2[3 - 2(-5 \cdot 3 + 6)]$

$$-4 - 2[3 - 2(-15 + 6)]$$

$$-4 - 2[3 - 2(-9)]$$

$$-4 - 2[3 + 18]$$

$$-4 - 2[21]$$

$$-4 - 42 = \boxed{-46}$$

4. Solve for  $x$ . Reduce when possible.

a.  $3x + 5 = 20$

$$3x = 20 - 5$$

$$\frac{3x}{3} = \frac{15}{3}$$

$$\boxed{x = 5}$$

c.  $\frac{3}{4}x - \frac{5}{3} = -2$

$$3(2) \cdot \frac{3}{4}x - \frac{4}{2} \cdot \frac{5}{3} = 2(-2)$$

$$9x - 20 = -24$$

$$9x = -24 + 20$$

$$\frac{9x}{9} = \frac{-4}{9}$$

$$\boxed{x = -\frac{4}{9}}$$

b.  $3(2x - 5) + 8 = 6x - (2x + 3)$

$$6x - 15 + 8 = 6x - 2x - 3$$

$$6x - 7 = 4x - 3$$

$$6x - 4x = -3 + 7$$

$$2x = 4$$

$$\boxed{x = 2}$$

5. Write the inequality for the statement.

The cost is at least \$150.

$$C \geq 150$$

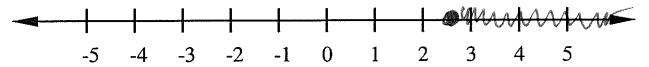
6. Solve and graph (on a number line).

a.  $\frac{2}{3}(4 + 5x) + 1 \geq 12$

$$\frac{8}{3} + \frac{10}{3}x + 1 \geq 12$$

$$3 \cdot \frac{8}{3} + 3 \cdot \frac{10}{3}x + 3 \cdot 1 \geq 3 \cdot 12$$

$$8 + 10x + 3 \geq 36$$



$$10x + 11 \geq 36$$

$$\frac{10x}{10} \geq \frac{25}{10}$$

$$x \geq \frac{5}{2}$$

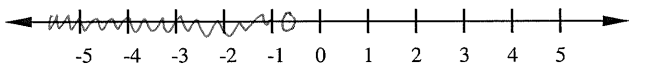
b.  $2(3 - 5x) + 4x < 3(5 + 2x)$

$$6 - 10x + 4x < 15 + 6x$$

$$6 - 6x < 15 + 6x$$

$$-6x - 6x < 15 - 6$$

$$\frac{-12x}{-12} < \frac{9}{-12}$$



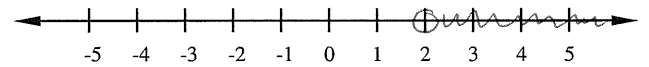
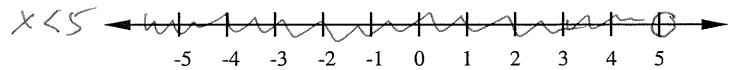
$$x > -\frac{3}{4}$$

7. Solve the compound inequality  $3x + 1 < 16$  and  $2x - 3 > 1$ . Graph your final simplified solution on the last graph.

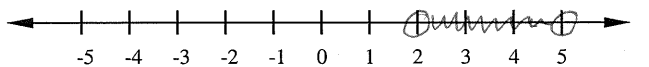
$$3x + 1 < 16 \quad \text{and} \quad 2x - 3 > 1$$

$$3x < 15 \quad 2x > 4$$

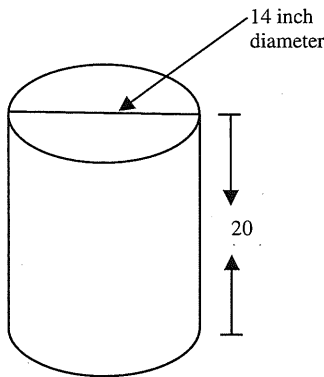
$$x < 5 \quad x > 2$$



Solution:



8. Calculate the volume of the right circular cylinder below.



$$V = \pi r^2 h \quad (\pi \approx 3.14)$$

$$r = 7 \text{ in.}$$

$$V = 3.14 (7)^2 (20)$$

$$V = 3077.2 \text{ cu. in.}$$

9. Change each decimal to a fraction. Reduce to lowest terms.

a.  $0.875 = \frac{875}{1000} = \frac{25(35)}{25(40)}$

$$= \frac{35}{40} = \frac{5 \times 7}{5 \times 8} = \frac{7}{8}$$

b.  $0.008 = \frac{8}{1000} = \frac{2}{250} = \frac{1}{125}$

10. Simplify the following polynomials by combining like terms.

$$(3r^2t^3 - 8r^3t^2 + 5r^2t^2 - rt^4) - (-4r^2t^2 + rt^4 - 7r^2t^3 + 2r^3t^2)$$

$$3r^2t^3 - 8r^3t^2 + 5r^2t^2 - rt^4 + 4r^2t^2 - rt^4 + 7r^2t^3 - 2r^3t^2$$

$$(3+7)r^2t^3 + (-8-2)r^3t^2 + (5+4)r^2t^2 + (-1-1)rt^4$$

$$10r^2t^3 - 10r^3t^2 + 9r^2t^2 - 2rt^4$$

11. **Money and Percents Problem:** The total cost of a meal, including a 15% tip, is \$133.63. Find the total cost of the meal before the tip was added.

$$\begin{aligned} \text{let } x &= \text{cost of meal before tip was added} \\ 0.15x &= \text{tip} \\ x + 0.15x &= 133.63 \end{aligned}$$

$$\begin{array}{r} 1.15x = 133.63 \\ \hline 1.15 \quad 1.15 \\ \hline x = 116.20 \end{array}$$

∴ Total cost of meal before tip was added was \$116.20.

12. **Money and Percents Problem:** A car rents for \$33.95 a day plus \$0.32 per kilometer. If your total bill (before taxes) is \$181.50 for a two-day rental, find how many kilometers you traveled.

$$\text{let } x = \text{no. of km traveled}$$

$$0.32x + 33.95(2) = 181.50$$

$$0.32x + 67.9 = 181.50$$

$$0.32x = 181.50 - 67.9$$

$$\begin{array}{r} 0.32x = 113.6 \\ \hline 0.32 \quad 0.32 \\ \hline \end{array}$$

$$x = 355$$

∴ No. of km traveled was 355 km

13. **Comparisons Problem:** A 17 m rope is cut into two pieces. One piece is 2 m longer than twice the other. Find the length of each piece.

$$\begin{aligned} \text{let } x &= \text{one piece} \\ 2x + 2 &= \text{other piece} \end{aligned}$$

$$x + 2x + 2 = 17$$

$$3x = 17 - 2$$

$$3x = 15$$

$$x = 5$$

∴ The lengths of both pieces are 5 m and 12 m.

14. Solve for  $t$ :  $T = t - qt$

$$\frac{T}{1-q} = \frac{t(1-q)}{1-q}$$

$$t = \frac{T}{1-q}$$

15. Consider the formula  $A = P(1 + rt)$ .

- a) Solve the formula for  $t$ .

$$A = P + Prt$$

$$\frac{A-P}{Pr} = \frac{Prt}{Pr}$$

$$t = \frac{A-P}{Pr}$$

- b) Find  $t$  when  $A = 26,000$ ,  $P = 20,000$ , and  $r = 0.02$ .

$$t = \frac{26000 - 20000}{20000(0.02)}$$

$$= \frac{6000}{400}$$

$$t = 15$$

16. Remove bracket symbols and simplify by combining like terms.

$$\begin{aligned}
 & x - \{-3y - [2x + 3(x - y) - 4(2x + 3y)] + 7\} \\
 & x - \{-3y - [2x + 3x - 3y - 8x - 12y] + 7\} \\
 & x - \{-3y - [-3x - 15y] + 7\} \\
 & x - \{-3y + 3x + 15y + 7\} \\
 & x - \{12y + 3x + 7\} \\
 & x - 12y - 3x - 7
 \end{aligned}$$

$-2x - 12y - 7$

17. Multiply and simplify when possible.

$$\begin{aligned}
 (5y^4 + 2y^3)(5y^4 - 2y^3) &= (5y^4)^2 - (2y^3)^2 \\
 &= 25y^8 - 4y^6
 \end{aligned}$$

18. Rewrite using a positive exponent:  $\frac{1}{x^{-10}}$

$$\frac{1}{x^{-10}} = x^{10}$$

19. Simplify:  $\left(\frac{-27a^4b^{-3}}{3a^{-1}b^4}\right)^{-3}$  Write your answer with positive exponents.

$$\begin{aligned}
 \left(\frac{-27a^4b^{-3}}{3a^{-1}b^4}\right)^{-3} &= \left(\frac{-9a^4a^1}{b^4b^3}\right)^{-3} = \left(\frac{-9a^5}{b^7}\right)^{-3} \\
 &= \left(\frac{b^7}{-9a^5}\right)^3 = \frac{b^{21}}{-729a^{15}}
 \end{aligned}$$

20. Multiply and simplify:  $(-6x^{-3}y^4)(-2x^7y^{-12})$  Write your answer with positive exponents.

$$\begin{aligned}
 & (-6)(-2) x^{-3} x^7 y^4 y^{-12} \\
 & 12 x^{-3+7} y^{4-12} \\
 & 12 x^4 y^{-8} \\
 & \frac{12x^4}{y^8}
 \end{aligned}$$

21. Divide using long division. Express your answer in the form  $\frac{\text{quotient} + \text{remainder}}{\text{divisor}}$ .

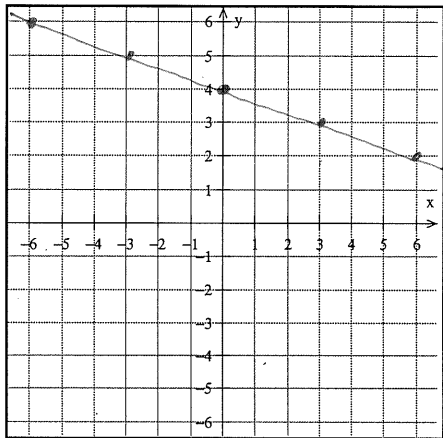
$$\begin{array}{r} 2x^3 + 9x^2 - x + 2 \\ 2x^2 + 3x - 1 \overline{) 2x^3 + 9x^2 - x + 2} \\ \underline{-(2x^3 + 3x^2 - x)} \phantom{+ 2} \\ 6x^2 + 0x + 2 \\ \underline{-(6x^2 + 9x - 3)} \\ -9x + 5 \end{array}$$

$(x + 3)$  → quotient  
 $(-9x + 5)$  remainder

$$\therefore x + 3 + \frac{-9x + 5}{2x^2 + 3x - 1}$$

22. Sketch the graph of the following equations.

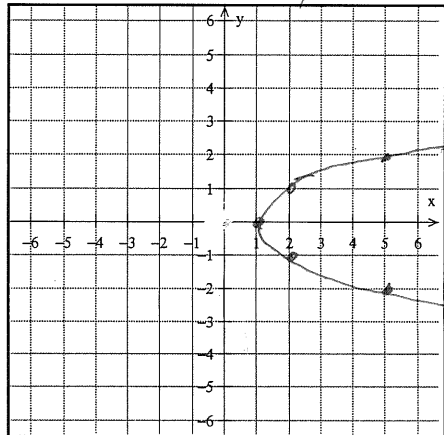
a.  $y = -\frac{1}{3}x + 4$



b.  $x = y^2 + 1$

assign values to y

x	y
5	-2
2	-1
1	0
2	1
5	2



23. Find the equation of the line that is parallel to the line  $x - 5y = 3$  and contains the point  $(-2, 3)$ .

$L_1: x - 5y = 3$

$$\frac{x}{5} = \frac{-x + 3}{-5}$$

$$y = \frac{1}{5}x - \frac{3}{5}$$

$$m = \frac{1}{5}$$

$L_2: ?$   $m = \frac{1}{5}$  and contains  $(-2, 3)$

$$3 = \frac{1}{5}(-2) + b$$

$$3 = -\frac{2}{5} + b$$

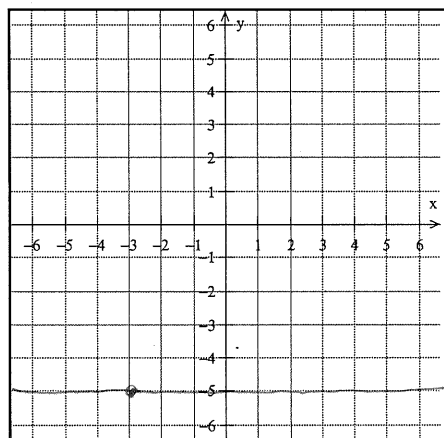
$$3 + \frac{2}{5} = b$$

$$b = \frac{17}{5}$$

$$\therefore y = \frac{1}{5}x + \frac{17}{5}$$

24. Find the equation of the line containing the point  $(-3, -5)$  that is parallel to the x-axis. Sketch the line.

equation:  
 $y = -5$



25. Solve the system of equations in two variables using any method, and check your result.

$$\begin{cases} 3y = 25 - 5x \\ 3x + 4y = 26 \end{cases} \quad \begin{array}{l} 4(5x + 3y = 25) \\ -3(3x + 4y = 26) \end{array}$$

$$\begin{array}{r} 20x + 12y = 100 \\ -9x - 12y = -78 \\ \hline 11x = 22 \end{array}$$

$$x = 2$$

$$3y = 25 - 5(2)$$

$$3y = 15$$

$$y = 5$$

$$\text{Soln. Pt: } (2, 5)$$