College Algebra — Joysheet 4
MAT 140, Spring 2023 — D. Ivanšić

Name: Saul Ocean

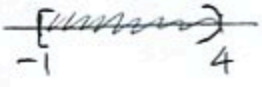
Covers: 1.5, 1.6 *Show all your work!*

Solve the inequalities. Write your solution in interval notation.

1. (5pts) $-5 \leq 4x - 1 < 15$ $|+1$

$-4 \leq 4x < 16$ $|\div 4$

$-1 \leq x < 4$

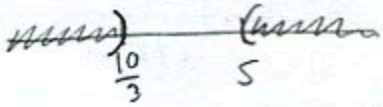


$[-1, 4)$

2. (7pts) $3x - 2 < 8$ or $5x + 4 > 29$ $|-4$ $|+2$

$3x < 10$ $|\div 3$ $5x > 25$ $|\div 5$

$x < \frac{10}{3}$ or $x > 5$



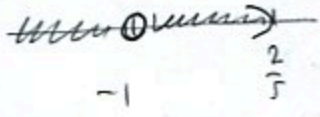
$(-\infty, \frac{10}{3}) \cup (5, \infty)$

3. (6pts) Find the domain of the function in interval notation: $f(x) = \frac{\sqrt{2-5x}}{x+1}$.

Must have $2 - 5x \geq 0$ $|-2$ Can't have $x + 1 = 0$

$-5x \geq -2$ $|\div -5$ $x = -1$

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



$(-\infty, -1) \cup (-1, \frac{2}{5})$

4. (14pts) Lawyers Mitch and James charge for legal services as follows: Mitch charges \$150 per hour, and James charges \$300 for the first three hours and then \$170 per hour for the hours after three. Suppose your case requires at least three hours of legal services. For which number of hours does Mitch have have the better deal? Solve as an inequality.

x = number of hours of legal services needed

Mitch cost: $150x$

James cost: $300 + 170(x - 3)$

Mitch cost $\leq$ James cost

$150x \leq 300 + 170(x - 3)$

$150x \leq 300 + 170x - 510$ $|-170x$

$-20x \leq -210$ $|\div (-20)$

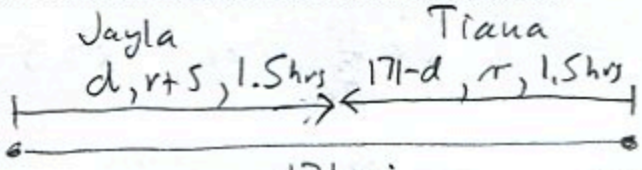
$x \geq \frac{-210}{-20} = 10.5$

Mitch is the better deal if you need more than 10.5 hours of legal services.

5. (14pts) At the same time, Jayla started driving from Paducah, and Tiana started driving from Elizabethtown. They drove toward each other along the same road and met on this road after one hour and 30 minutes. The distance from Paducah to Elizabethtown is 171 miles and Jayla drove 5 mph faster than Tiana.

a) How fast was each woman driving?

b) How far from Paducah did the women meet?



← distance, rate, time for each driver

distance = rate · time

$d = (r+5)1.5$

$171 - d = r \cdot 1.5$

$171 - (r+5)\cdot 1.5 = r \cdot 1.5$

$171 - 1.5r - 7.5 = 1.5r \quad |+1.5r$

$163.5 = 3r$

$r = \frac{163.5}{3} = 54.5$ (Tiana's speed)

a) Tiana drove 54.5 mph
Jayla drove 59.5 mph

b) $d = 59.5 \cdot 1.5 = 89.25$ miles from Paducah,

6. (14pts) Amanda invested some money at 4% simple interest, and some at 5% simple interest. If her total interest over 1 year was \$97, and she invested \$500 more at 5% than she did at 4%, how much did she invest at each interest rate?

x = amount invested at 4%

$x+500$ = amount invested at 5%

interest from 4% part + interest from 5% part = 97

$x \cdot 0.04 \cdot 1 + (x+500)0.05 \cdot 1 = 97$

$0.04x + 0.05x + 25 = 97 \quad |-25$

$0.09x = 72$

$x = \frac{72}{0.09} = 800$

800 invested at 4%
1300 invested at 5%