

Math 114**Exam 2 review (Solutions)**

Use the following set to answer questions 1 through 7

$$A = \{2,4,6,8,10,12,14\}, B = \{10,12,14,16,18,20\}, C = \{10,14,18,20,22,24\}, D = \emptyset, E = \{2,4,6,8\}$$
$$U = \{2,4,6,8,10,12,14,16,18,20,22,24,26,28,30\}$$

1) Is $E \subseteq A$? Yes

2) Is $B \subseteq A$? No

3) Find $A \cup B$

$$A \cup B = \{2,4,6,8,10,12,14,16,18,20\}$$

4) Find $A \cap B$

$$A \cap B = \{10,12,14\}$$

5) Find $C \cup B$

$$C \cup B = \{10,12,14,16,18,20,22,24\}$$

6) Find $n(A \cup B)$

$$n(A \cup B) = 10$$

7) Find $n(B)$

$$n(B) = 7$$

8) Make a Venn Diagram using the sets $A, B,$ and U

Subsets

9) Find all the possible subsets of the set $\{a, b, c\}$

$$\{a, b, c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a\}, \{b\}, \{c\}, \emptyset$$

10) How possible subsets does a subset with 12 elements have?

$$2^{12} = 4096$$

11) If $A \subset B$, then find $A \cup B$ and $A \cap B$. What is $A \cap \phi$ and $A \cup \phi$, if A is nonempty?

Extra Credit

Scientific Notation

12) Write 609,000,000,000 in scientific notation.

$$6.09 \times 10^{11}$$

13) Write 9.15×10^9 in decimal notation.

$$9,150,000,000$$

14) Simplify $(4 \times 10^9)(5 \times 10^6)$

$$(4 \times 10^9)(5 \times 10^6) = 20 \times 10^{9+6} = 20 \times 10^{14} = 2.0 \times 10^{15}$$

15) Simplify $\frac{8 \times 10^9}{4 \times 10^{-5}}$

$$\frac{8 \times 10^9}{4 \times 10^{-5}} = 2 \times 10^{9-(5)} = 2 \times 10^{14}$$

16) Simplify $\frac{(5 \times 10^6)(6 \times 10^{14})}{4 \times 10^8}$

$$\frac{(5 \times 10^6)(6 \times 10^{14})}{4 \times 10^8} = \frac{30 \times 10^{6+14}}{4 \times 10^8} = \frac{30 \times 10^{20}}{4 \times 10^8} = 7.5 \times 10^{12}$$

Linear Models

17) Find the slope of a line between the points (2,3) and (4,7)

$$m = \frac{7-3}{4-2} = \frac{4}{2} = 2$$

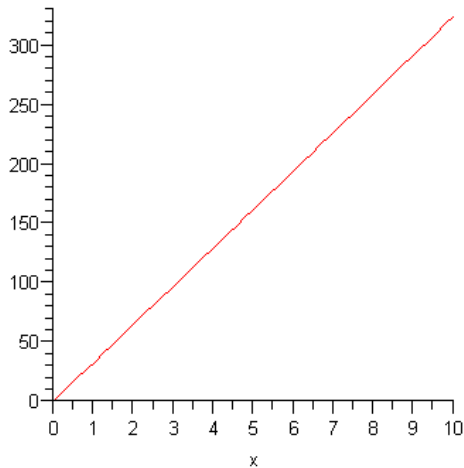
18) Find the slope of the line given by the equation $2x + 3y = 9$

$$\begin{aligned}2x + 3y &= 9 \\2x - 2x + 3y &= -2x + 9 \\3y &= -2x + 9 \\\frac{3y}{3} &= \frac{-2x}{3} + \frac{9}{3} \\y &= -\frac{2}{3}x + 3\end{aligned}$$

$$m = -\frac{2}{3}$$

19) The revenue of a company that makes backpacks is given by the formula $R = 32.40x$ where x represents the number of backpacks sold.

a) Graph the linear model $R = 32.40x$



b) Use the model to calculate the revenue for selling 40 backpacks?
 $R = 32.40x = 32.40(40) = \1296

c) What is the slope of the model? $m = 32.4$

d) What is the meaning of the slope? Dollars in Revenue per unit

- 20) An approximate linear model that gives the remaining distance, in miles, a plane must travel from San Francisco to London given by $d = 5500 - 500t$ where d is the remaining distance and t is the hours after the flight begins. Find the remaining distance to London after 2 hours and 4 hours.

$$d = 5500 - 500(2) = 5500 - 1000 = 4500$$

$$d = 5500 - 500(4) = 5500 - 2000 = 3500$$

Quadratic Models

- 21) The path of a cannon ball is given by the equation $y = -.05x^2 + 6.0x$ where x is the horizontal distance the ball travels and y is the height of the cannon ball. Find the maximum height of the cannon ball in feet.

$$x = \frac{-b}{2a} = \frac{-6}{2(-.05)} = \frac{-6}{-.1} = 60 \text{ ft}$$

$$y = -.05(60)^2 + 6.0(60) = 180 \text{ ft}$$

- 22) Find the vertex and x-intercepts of the given parabola, and then make a sketch of the parabola: $y = x^2 - 5x + 6$

Vertex

$$x = \frac{-(-5)}{2(1)} = 2.5$$

$$y = (2.5)^2 - 5(2.5) + 6 = -.25$$

$$(2.5, -.25)$$

x-intercepts

$$x^2 - 5x + 6 = 0$$

$$(x - 2)(x - 3) = 0$$

$$x - 2 = 0 \text{ or } x - 3 = 0$$

$$x = 2 \text{ or } x = 3$$

$$(2,0) \text{ and } (3,0)$$

Graph of $y = x^2 - 5x + 6$

