Math 221 Worksheet 1
Wednesday 08/28/18

Algebra Review

Solutions

Instructions. Put the first and last name of everyone in your workgroup at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to show your work and explain your reasoning.

1. Find equations for the following lines and sketch their graphs.

(a) The line with slope 3 and y-intercept 2.
\[ y = mx + b \]
\[ y = 3x + 2 \]

(b) The line with slope 3 passing through the point (2,1).
\[ y - y_0 = m(x - x_0) \]
\[ y - 1 = 3(x - 2) \]
\[ y = 3x - 5 \]

(c) The line which contains the points (1,1) and (3,2).
\[ m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 1}{3 - 1} = \frac{1}{2} \]
\[ y - y_1 = m(x - x_1) \]
\[ y = \frac{1}{2}x + \frac{1}{2} \]

2. The height and velocity of a projectile in feet at time t in seconds is given by:

\[ h(t) = -16t^2 + 50t + 8, \quad v(t) = \frac{dh}{dt} = -32t + 50 \]

(a) How high was the projectile when it was fired?
\[ p(0) = -16(0)^2 + 50(0) + 8 = 8 \text{ feet} \]

(b) How fast was the projectile fired?
\[ v(0) = -32(0) + 50 = 50 \text{ ft/sec} \]

(c) When is the projectile at the highest point?

\[ v(t) = 0 \]
\[ -32t + 50 = 0 \]
\[ t = \frac{50}{32} = \frac{25}{16} \text{ seconds} \]
\[ A + \frac{25}{16} \text{ seconds} = 1.5625 \text{ sec} \]

\[ \frac{25}{16} \text{ seconds} = 1.5625 \text{ sec} \]
3. Determine the point of intersection of the two lines determined by $2x + 3y = 4$ and $4x + 5y = 7$.

$$3y = 4 - 2x \quad \Rightarrow \quad y = \frac{4}{3} - \frac{2}{3}x$$

$$y = \frac{4}{3} - \frac{2}{3}x$$

$$4x + 5 \left( \frac{4}{3} - \frac{2}{3}x \right) = 7$$

$$\frac{2}{3}x = \frac{1}{3}$$

$$x = 1$$

$$3 \left( \frac{1}{3} \right) + 3y = 4$$

$$y = 1$$

4. Simplify the following fraction by rationalizing the denominator, then factoring to cancel a term between the numerator and denominator.

$$f(x) = \frac{x - 5}{\sqrt{42x^2 + 46} - 16}$$

$$= \frac{(x-5)\left(\sqrt{42x+46}+16\right)}{42x-210}$$

$$= \frac{(x-5)\left(\sqrt{42x+46}+16\right)}{42(x-5)}$$

$$= \frac{\sqrt{42x+46}+16}{42}$$

5. **True or False**: The function $y = \frac{9x - 63}{x^3 + 6x - 91}$ has a vertical asymptote at $x = 7$.

$$y = \frac{9(x-7)}{(x-7)(x+13)}$$

The graph has a hole at $x = 7$ and a VA at $x = -13$.

6. For all $\theta$, the quantity $\sin(\pi + \theta)$ is equivalent to which one of the following?

(a) 0  (b) 1  (c) $\sin \theta$  (d) $-\sin \theta$  (e) $\cos \theta$  (f) $-\cos \theta$

7. Carefully sketch a graph of each of the following function. Show more than one period and include $x$-intercepts and $y$-intercepts.

$$f(x) = 5 + 2\cos x$$

**Snapshots** at jasonkaye.com

Professor Herman stopped when he heard that unmistakable thud — another brain had imploded.