Math 1200 (Fall 2015) Exam 2 B Name.................

Show ALL your work to get full/partial credit. Each problem is worth 5 points.

1. Write an inequality to represent the statement: A pilot is instructed to keep her plane at an altitude of over 25,000 feet but not to exceed 30,000 feet.

$$25,000 < x \le 30,000$$

Solve the inequalities and state the answer in an interval notation.

2. $3|z-14| + 10 > 4$

$3|z-14| > -6$

$|z-14| > -2$

absolute value of something is always positive $\Rightarrow \mathbb{R}$: $\boxed{(-\infty, \infty)}$

3. $|x+3| < 4$

$-4 < x+3 < 4$

$-7 < x < 1$

$\boxed{(-7, 1)}$

4. Use the quadratic formula to solve $9x^2 - 4x + \frac{1}{3} = 0$

$27x^2 - 12x + 1 = 0$

$x = \dfrac{12 \pm \sqrt{144 - 4(27)(1)}}{2(27)}$

$x = \dfrac{12 \pm \sqrt{144 - 108}}{54}$

$x = \dfrac{12 \pm \sqrt{36}}{54}$

$x = \dfrac{12 \pm 6}{54}$

$\Rightarrow x = \dfrac{12+6}{54} = \dfrac{18}{54} = \dfrac{9}{27} = \boxed{\dfrac{1}{3}}$

$x = \dfrac{12-6}{54} = \dfrac{6}{54} = \dfrac{3}{27} = \boxed{\dfrac{1}{9}}$

5. Solve using the zero product property $x^2 + 5x = 24$

$x^2 + 5x - 24 = 0$

$(x+8)(x-3) = 0$

$x + 8 = 0$

$\boxed{x = -8}$

or $x - 3 = 0$

$\boxed{x = 3}$

6. Solve using the square root property $(w-5)^2 = 9$

$\sqrt{(w-5)^2} = \pm\sqrt{9}$

$w - 5 = \pm 3$

$w = 5 \pm 3$

so, $w = 5 + 3$

$\boxed{w = 8}$

$w = 5 - 3$

$\boxed{w = 2}$

7. Solve $\sqrt{x+2} - 1 = \sqrt{x-7}$

$\left[\sqrt{x+2} - 1\right]^2 = \left[\sqrt{x-7}\right]^2$

$x + 2 - 2\sqrt{x+2} + 1 = x - 7$

$x + 3 - 2\sqrt{x+2} = x - 7$

$-2\sqrt{x+2} = -10$

$\sqrt{x+2} = -5$

$\left[\sqrt{x+2}\right]^2 = [-5]^2$

$x + 2 = 25$

$\boxed{x = 23}$

8. If A = {-2, 0, 4, 6, 8, 10, 12} and B = {-1, 1, 3, 5, 7, 9}, find $A \cap B$.

$\boxed{A \cap B = \emptyset}$ because the two sets have no common terms

9. If $f(x) = 2x^2 - x$, find the average rate of change in f(x) from $x_1 = -1$ to $x_2 = 2$.

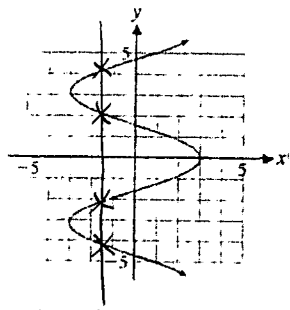
$f(x_1) = f(-1) = 2(-1)^2 - (-1) = 2 + 1 = 3$

$f(x_2) = f(2) = 2(2)^2 - (2) = 6$

then avg rate of change: $\frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{6 - 3}{2 + 1} = \frac{3}{3} = \boxed{1}$

10. Determine (using vertical line test) if this relation defines a function.

Not a function, vertical line intersects the graph more than once.



For 11 - 12 find the restrictions, if any, and state the domain in interval form.

11. $F(x) = \sqrt{(x-4)}$

$x - 4 \geq 0$

$\boxed{x \geq 4}$ $\boxed{[4, \infty)}$

12. $H(x) = \frac{2}{x-5}$

$x - 5 \neq 0$ $(-\infty, 5) \cup (5, \infty)$

$\boxed{x \neq 5}$

13. Suppose that a child tosses a ball straight upward from a height of 1.5 ft, with an initial velocity of 48 ft/sec. Write the expression which gives you the vertical position of the ball, use $s(t) = -\frac{1}{2}gt^2 + v_0t + s_0$ where g = 32 ft/sec^2

$V_0 = 48$

$S_0 = 1.5$

$g = 32$

$$\boxed{s(t) = -\frac{1}{2}(32)t^2 + 48t + 1.5}$$

If $G(x) = 25x + 100$, find

14. The x-intercept

$0 = 25x + 100$

$-100 = 25x$

$-4 = x$

$\boxed{(-4, 0)}$

15. The y-intercept

$y = 25(0) + 100$

$y = 100$

$\boxed{(0, 100)}$

16. Find the equation of the line that passes through (2, 1) and perpendicular to $y = \frac{1}{5}x - 7$.

$y = \frac{1}{5}x - 7 \Rightarrow$ slope is $\frac{1}{5}$, now we want a perpendicular slope so our $M = -5$. Then using point-slope form we have:

$$\boxed{y - 1 = -5(x - 2)}$$

17. Write the equation of the line in #16 in the slope-intercept form.

slope-intercept form:

$y = mx + b$

So, $y - 1 = -5(x - 2)$

$y - 1 = -5x + 10$

$\boxed{y = -5x + 11}$

For #s18 -20, use the information that the end points of a circle's diameter are (-1, -1) and (3, 3), find

18. The center (using the Midpoint Formula)

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$M = \left(\frac{-1+3}{2}, \frac{-1+3}{2}\right) = \boxed{(1, 1)}$$

19. Find the length of the radius.

using center & pt $(-1, -1)$ we have:

$$r = \sqrt{(-1-1)^2 + (-1-1)^2}$$

$$= \sqrt{4 + 4} = \sqrt{8} = \sqrt{4} \cdot \sqrt{2} = \boxed{2\sqrt{2}}$$

20. Write the equation of the circle in the standard form.

Standard form: $(x - h)^2 + (y - k)^2 = r^2$ where center: (h, k)

radius: r

So, we have:

$$\boxed{\begin{aligned}(x-1)^2 + (y-1)^2 &= (2\sqrt{2})^2 \\ (x-1)^2 + (y-1)^2 &= 8\end{aligned}}$$