Name:_____

Multiple choice problems arevworth four points each; workout problems worth six points each. You must show your work on the work-out problems.

1. The midpoint M between points $P(x_1, y_1)$ and $Q(x_2, y_2)$ has coordinates

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

   B. $\left(\frac{x_2 - x_1}{2}, \frac{y_2 - y_1}{2}\right)$

   C. $\left(\frac{x_1 - x_2}{2}, \frac{y_1 - y_2}{2}\right)$

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

2. Find the distance between the points $P(3, -2)$ and $Q(-3, 6)$.

3. The equation of a circle with center $C(h, k)$ and radius r is

   A. $\frac{y - k}{x - h} = r$

   B. $d(P, Q) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

   C. $(x - h)^2 + (y - k)^2 = r^2$

   D. $(x - h) + (y - k) = r$

4. Find the x and y-intercepts of $x^2 - 6x - 3y + 9 = 0$.

5. The slope-intercept equation of a line is

   A. $y - y_1 = m(x - x_1)$

   B. $y = mx + b$

   C. $ax + by + c = 0$

   D. $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

6. Find the equation of the line which is parallel to $y = 3x - 5$ and which contains the point $(1, -2)$.

7. The domain of the function $f(x) = \dfrac{x-3}{x-2}$ is

   A. $(2, \infty)$

   B. $(-\infty, 2) \cup [2, \infty)$

   C. $(-\infty, 2) \cap (2, \infty)$

   D. $(-\infty, 2) \cup (2, \infty)$

8. Given $f(x) = x^3 - 4x$ find $f(-x)$ then specify whether f is even, odd or neither.

9. The formula for the average value of the function f on the interval $[a, b]$ is

   A. $\dfrac{f(x) - f(a)}{x - a}$

   B. $\dfrac{f(b) - f(a)}{b - a}$

   C. $\dfrac{f(x + h) - f(x)}{h}$

   D. $\dfrac{f(x) + f(a)}{x + a}$

10. Given $f(x) = 3x^2$ find and simplify the difference quotient on the interval $[x, x + h]$.

11. The graph of $y = |\, x \,|$ is decreasing on the interval

    A. $(-\infty, 0)$

    B. $(-\infty, \infty)$

    C. $(0, \infty)$

    D. $(-1, 1)$

12. Let $f(x) = \dfrac{x}{x - 1}$ and $g(x) = x + 3$. Find the composition function $(f \circ g)(x)$ and specify its domain in interval notation.

13. The graph of $y = (x+3)^2$ is the same as the graph of $y = x^2$ but

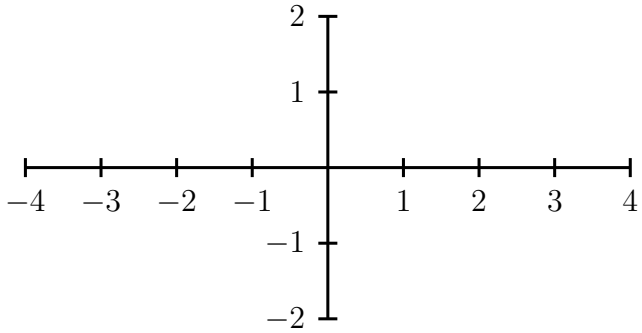
    A. shifted three units to the right

    B. shifted three units to the left

    C. shifted three units up

    D. shifted three units down

14. Sketch the graph of $y = \left|\frac{x}{2}\right|$.



15. If no horizontal line intersects the graph of a function more than once, the function is said to be

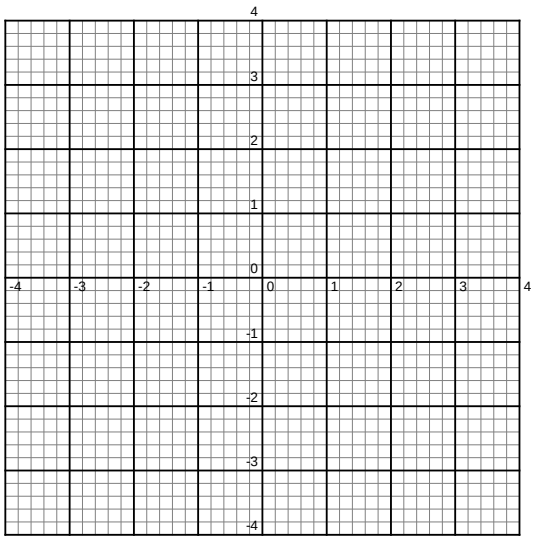
    A. increasing

    B. decreasing

    C. constant

    D. one-to-one

16. Sketch the graph of $(x+2)^2 + (y-1)^2 = 1$



17. The equation of the vertical line containing the point (a, b) is

    A. $y = a$

    B. $y = b$

    C. $x = a$

    D. $x = b$

18. The general equation of a line is $2x - 3y + 24 = 0$. Find the slope-intercept equation of the line and specify the values of the slope m and the y-intercept b.

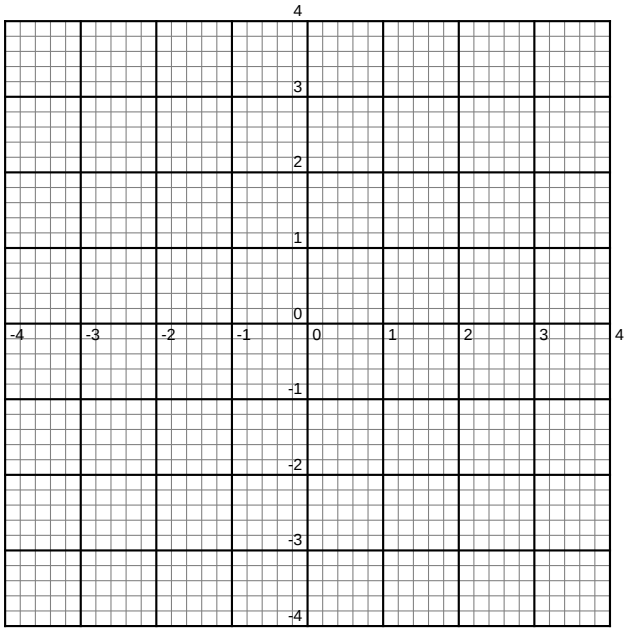
19. If $f(x) = 2x - 3$ and $g(x) = 2 - 3x$ then $(f - g)(x) =$

    A. $-x - 5$

    B. $-x - 1$

    C. $-3 - 3x$

    D. $5x - 5$

20. Given that $f(x) = \dfrac{x}{x - 1}$ find $f^{-1}(x)$.

Bonus: (10 points) Sketch the graph of $f(x) = \begin{cases} \sqrt{-x} \text{ for } x < 0 \\ -\sqrt{x} \text{ for } x \geq 0 \end{cases}$