

Midterm 1 Review problems

Here are some review problems for the midterm, for you to study and practice.

1. T F If $(f \circ g)(x) = (g \circ f)(x)$ for all functions $f(x)$ and $g(x)$.
2. T F If f is an even function, and the point $(-9, 2)$ is on the graph of f , then $(9, 2)$ is on the graph of f .
3. T F $|x| = 0$ means $x = 0$.
4. T F $|x + 2| = 0$ means that both $x = -2$ and $x = 2$ are possible.
5. T F $f(x) + g(x) = (f + g)(x)$
6. T F Every line has a defined slope.
7. T F The lines $3y - 18x - 6$ and $6y + x = 3$ are perpendicular.
8. T F The graph of $f(x - 1)$ is the graph of f shifted left one unit.
9. T F $x^2 + 1 = 0$ has a solution
10. If $f(x) = 2x + 3$, what is $f(x + h)$?
11. Describe the domain of $\left(\frac{f}{g}\right)(x)$.
12. Find the center and radius of each of the following circles:
 - (a) $x^2 + 6x + y^2 - 2y + 6 = 0$
 - (b) $x^2 - 8x + y^2 - 10y + 32 = 0$
 - (c) $x^2 + y^2 + 2y - 8 = 0$

13. Each graph defines a function f . Contemplate and answer the following deep questions for each graph. (2 points each)
- a) What is the domain of f ?
 - b) What is the range of f ?
 - c) On what interval is f increasing?
 - d) For which value(s) of x is $f(x) = f(3)$?
 - e) What is $f(f(1))$?

14. What is the distance between $(3, 2)$ and $(6, 4)$?

15. Between $(3, 1)$ and $(0, -1)$?

16. Between $(1, 1)$ and $(4, 0)$?

17. Find the difference quotient for each of the following:

(a) $f(x) = 3x + 1$

(b) $f(x) = x^2 + 2$

(c) $f(x) = \frac{1}{x}$

(d) $f(x) = x^2 + 2x$

(e) $f(x) = \sqrt{x}$

(f) $f(x) = 3x$

(g) $f(x) = 12$

(h) $f(x) = |x|$

(i) $f(x) = -4x + 1$

(j) $f(x) = |x| - \sqrt{x}$

18. Solve each of the following:

(a) $x^2 + 2x - 1 = 0$

(b) $x^2 - 3x + 2 = 0$

(c) $2x^2 + 4x - 1 = 0$

(d) $x^2 - 2x + 3 = 0$

(e) $x^2 + 4x + 4 = 0$

(f) $x^2 - x - 6 = 0$

(g) $x^2 - 3x - 40 = 0$

(h) $x^2 + x - 2 = 0$

(i) $x^2 + 3x - 4 = 0$

(j) $|x + 2| = -3$

(k) $|2x - 1| = 4$

(l) $|3x - 1| = 6$

(m) $|x^2 + 1| = 2$

(n) $|x - 3| = 1$

19. Write each of the following in terms of absolute value:

(a) x is 3 units or less away from 3.

(b) The distance between x and 4 is 12.

(c) x is 2 more than 2 units from 7.

20. Write the solution of each of the following in interval notation:

(a) $2x \geq 28$

(b) $|x - 3| < 2$

(c) $\sqrt{x} > 0$

21. Write each of the following in interval notation:

(a) $2 > x \geq 3$

- (b) $x \leq \pi$
- (c) $x > 12$
- (d) $-5 \leq x \leq 3$

22. Graph each of the following:

- (a) $f(x) = (x + 2)^2 - 1$
- (b) $f(x) = 3|x| - 2$
- (c) $f(x) = (x - 4)^2 + 1$
- (d) $f(x) = x^3 - 2$
- (e) $f(x) = x^2 - 1$
- (f) $f(x) = 6(x + 1)^2 - 2$
- (g) The circles above.