

Howard University: Department of Mathematics
College Algebra I Final Exam Spring 2007

Name:
Student ID:

ANSWER ALL QUESTIONS IN THE BOOKLET PROVIDED. EACH MULTIPLE CHOICE QUESTION IS WORTH 5 POINTS; THERE IS NO PARTIAL CREDIT. EACH SHORT ANSWER QUESTION IS WORTH 10 POINTS; SHOW ALL WORK TO RECEIVE CREDIT.

Multiple Choice. In questions 1 - 20, choose the one alternative that best completes the statement or answers the question.

1. Write the equation for x if x varies directly with the cuberoot of y and inversely with z^2

(a) $x = \frac{ky^3}{z^2}$ (b) $x = \frac{ky^2}{z^3}$ (c) $x = \frac{k\sqrt[3]{y}}{z^2}$ (d) $x = \frac{k^3y}{z^2}$ (e) none of the above

2. Find the vertex of the parabola $y = (x - 1)^2 - 2$.

(a) (1,2) (b) (1,-2) (c) (-1,2) (d) (-1,-2) (e) none of the above

3. Solve the inequality $2x^2 + x - 3 \leq 0$

(a) $(-\infty, \frac{-3}{2}] [1, \infty)$ (b) $[\frac{-3}{2}, 1]$ (c) $(1, \infty)$ (d) $(-\infty, \frac{-3}{2})$ (e) none of the above

4. Find the equation of the line that is parallel to the line $x - y = 2$ and passes through (2,6)

(a) $x - y = 4$ (b) $y = 2x + 2$ (c) $x + y = 8$ (d) $x - y + 4 = 0$ (e) none of the above

5. Find the center and radius of the circle $x^2 + y^2 + 2x - 4y = 11$

(a) (2,3) $r = 16$ (b) (-2,3) $r = 4$ (c) (2,-3) $r = 4$ (d) (2,-3) $r = 16$
(e) none of the above

6. Using the variable x , the interval $(-3,5]$ can be written as:

- (a) $-3 \leq x \leq 5$ (b) $-3 < x \leq 5$ (c) $(-3 < x < 5)$ (d) $-3 \leq x \leq 5$ (e) none of the above

7. The volume of a right circular cylinder with diameter 8 *inches* and height 10 *inches* is:

- (a) $640\pi \text{ in}^2$ (b) $200\pi \text{ in}^2$ (c) $160\pi \text{ in}^2$ (d) $80\pi \text{ in}^2$ (e) none of the above

8. If $(2,b)$ is a point on the graph of $y = x^2 + 4x$, what is b ?

- (a) 12 (b) 8 (c) 2 (d) 4 (e) none of the above

9. $(\frac{27}{8})^{-2/3}$ equals:

- (a) $\frac{9}{4}$ (b) $\frac{4}{9}$ (c) $\frac{-9}{4}$ (d) $\frac{16}{81}$ (e) none of the above

10. Find the domain of $f(x) = \frac{1}{\sqrt{x-2}}$

- (a) $x \neq -2$ (b) $x > 2$ (c) $x \geq 2$ (d) $x = 2$ (e) none of the above

11. Solving $\frac{5}{2x-3} = \frac{3}{x+5}$ for x gives:

- (a) -5 (b) 4 (c) 34 (d) $\frac{3}{2}$ (e) none of the above

12. The value of $2x^3 - 3x^2 + 5x - 4$ when $x = -1$ is:

- (a) 0 (b) -4 (c) 6 (d) -14 (e) none of the above

13. Given that 3, 4, 5; 4, 5, 6; 6, 8, 10; 5, 12, 13; are the lengths of sides of 4 triangles respectively, how many of these triangles are right triangles?

- (a) one (b) two (c) three (d) four (e) none of the above

14. Find the vertical asymptote for the function $f(x) = \frac{x-1}{x+2}$

- (a) $x = 1$ (b) $x = 2$ (c) $x = -1$ (d) $x = -2$ (e) none of the above

15. Find the equation of the circle with radius 4 and center at $(2,-3)$

- (a) $(x+2)^2 + (y-3)^2 = 16$ (b) $(x-2)^2 + (y+3)^2 = 4$

(c) $(x+2)^2 + (y+3)^2 = 16$ (d) $x^2 + y^2 - 4x + 6y - 3 = 0$ (e) none of the above

16. Solving the inequality $0 \leq 2x - 6 \leq 4$ and expressing the answer in interval notation gives:

(a) $[-3,5]$ (b) $[5,3]$ (c) $[3,5)$ (d) $(3,5)$ (e) none of the above

17. Find the equation of the line through $(0,1)$ and $(1,0)$.

(a) $x - y = 1$ (b) $x + y = 1$ (c) $x - y = 0$ (d) $x + y = 2$ (e) none of the above

18. $1 - 8x^2 - 9x^4$ factored as completely as possible is:

(a) $(1-x)(1+x)(1+9x^2)$ (b) $(1-x)(1+x)(1-3x)(1+3x)$
(c) $(1+x^2)(1-3x)(1+3x)$ (d) $(1+x)(1-9x)$ (e) none of the above

19. If $f(x) = \frac{2}{x}$ and $g(x) = \frac{5x}{x+3}$, find the composite function $(g \circ f)(x)$

(a) $\frac{x+3}{10x}$ (b) $\frac{2x+3}{5x}$ (c) $\frac{10}{3x+2}$ (d) $\frac{10}{x+3}$ (e) none of the above

20. Solve for x : $|1 - 2x| + 6 = 9$

(a) $\{-1\}$ (b) $\{\frac{-1}{2}, 2\}$ (c) $\{-1, 2\}$ (d) $\{-1, 2\}$ (e) none of the above

Short Answer. Show all work

21. Factor completely

a) $x^4 - 1$
b) $x^3 + 125$

22. Reduce the rational expression $\frac{4x^2+8x}{12x+24}$ to its lowest terms.

23. Sandra is paid time-and-a-half for hours worked in excess of 40 hours. She worked 48 hours and received \$442. What is her hourly rate?

24. Find all solutions to each equation:

a) $\sqrt{12-x} = x$
b) $(x+2)^2 + 7(x+2) + 12 = 0$

25. Solve the inequality $-9 \leq \frac{2x+3}{-4} \leq 7$ and graph the solution set on the real line and express it in interval notation.

26. Graph the function $y = |x| - 2$

27. Simplify each expression. Write answer b) with positive exponents only.

a) $2\sqrt{18} + 4\sqrt{32}$

b) $\frac{(xy)^3 z^2}{x^{-3} y^4 z^{-1}}$

28. Graph the function $f(x)$, where f is defined by

$$f(x) = \begin{cases} 1 + x & , \text{if } x < 0 \\ x^2 & , \text{if } x \geq 0 \end{cases}$$

29. Find the vertex of the parabola $y = x^2 + 6x + 7$ and graph it.

30. Find the domain, the horizontal and vertical asymptotes for the function $y = \frac{x+1}{x-1}$