

Sample Placement Exam 1

Name _____
(print)

I have neither given nor received aid on this exam, nor will I discuss it with anyone until all students have taken the departmental exam.

Pledged _____

No calculators are allowed on the Placement Exam.

1. Multiply:

a. $-\frac{6y^4}{z^3}$ b. $\frac{3y^4}{2z^3}$ c. $-\frac{6x^4y^4}{z^3}$ d. $-\frac{3y^4}{2z^3}$ e. none of these

2. Solve: $x^2 - 3x > 4$

a. $(-\infty, 0) \cup (3, \infty)$ b. $(-1, 4)$ c. $(-\infty, -4) \cup (1, \infty)$
d. $(-\infty, -1) \cup (4, \infty)$ e. none of these

3. Multiply: $(2x - 3y)^3$

a. $8x^3 - 36x^2y + 54xy^2 - 27y^3$ b. $8x^3 - 27y^3$ c. $8x^3 - 36x^2y - 18xy^2 - 27y^3$
d. $8x^3 - 12x^2y - 18xy^2 + 27y^3$ e. none of these

4. Solve for x: $\frac{3-x}{x+2} \leq 0$

a. $(-2, 3]$ b. $(-\infty, -2) \cup [3, \infty)$ c. $(-2, 3) \cup (3, \infty)$
d. $(-\infty, -2) \cup (-2, 3]$ e. none of these

5. Simplify: $\left(\frac{x^{\frac{4}{3}}}{8y^{-6}}\right)^{\frac{2}{3}}$

- a. $\frac{x y^{\frac{20}{3}}}{4}$ b. $\frac{x^{\frac{8}{9}} y^{\frac{8}{3}}}{4}$ c. $\frac{x^{\frac{8}{9}} y^4}{4}$ d. $\frac{x^{\frac{8}{9}}}{4y^4}$ e. none of these

6. Simplify: $(3x^3 + 4x^2 - 6) - (-4x^3 + 2x - 7)$

- a. $7x^3 + 2x^2 + 1$ b. $7x^3 + 4x^2 - 2x + 1$ c. $7x^3 + 4x^2 + 2x - 13$
d. $7x^3 + 4x^2 - 2x - 1$ e. none of these

7. Simplify: $\frac{x-2}{x^2+4x} - \frac{3x}{x^2-16}$

- a. $-\frac{2(x^2-2x+8)}{x(x^2-16)}$ b. $-\frac{2(x-1)}{x(x-4)}$ c. $-\frac{2(x+1)}{x(x^2-16)}$
d. $-\frac{2(x^2+3x+4)}{x(x+4)(x-4)}$ e. none of these

8. The remainder when $x^3 + 3x^2 + 4x - 6$ is divided by $x + 3$ is

- a. -18 b. 12 c. 0 d. -72 e. none of these

9. Which of the following is a factor of $16a^3b^2c - 2b^5c$?

- a. $4a^2 - 2ab + b^2$ b. $4a^2 + 2ab - b^2$ c. $2a + b$
d. $4a^2 + 2ab + b^2$ e. two of these

10. Simplify: $\frac{4^{-1} - x^{-1}}{x^{-2} - 4^{-2}}$

- a. $-\frac{4x}{x+4}$ b. $\frac{4x}{x+4}$ c. $-(x+4)$ d. $-x+4$ e. none of these

11. When $\frac{3(x-1)^{\frac{2}{3}} - (x-4)(x-1)^{-\frac{1}{3}}}{(x-1)}$ is expressed in simplified form the numerator is:

- a. $1-x^2$ b. $7-3x-x^2$ c. $2x+1$ d. $-12+5x-x^2$ e. none of these

12. Which of the following is a factor of $(x^2 + 5y + 3ax + 15a)$.

- a. $x+a$ b. $y+5$ c. $3a+y$ d. $x+y$ e. none of these

13. Solve: $|-4x+3| > 15$

- a. $\left(-\frac{9}{2}, 3\right)$ b. $(-\infty, -3) \cup \left(\frac{9}{2}, \infty\right)$ c. $\left(-3, \frac{9}{2}\right)$
d. $\left(-\infty, -\frac{9}{2}\right) \cup (3, \infty)$ e. none of these

14. When $\frac{x^2-4}{x^2-4x} \div \frac{x^2-5x+6}{x^2-2x-8}$ is simplified the numerator is:

- a. $(x+2)^2$ b. $(x-2)^2(x-3)$ c. x^2-4
d. $(x^2-4)(x+4)$ e. none of these

15. Which of the following is the smallest solution for: $|2x - 4| = -6$
- a. -1 b. -5 c. 1 d. 5 e. none of these
16. Evaluate: $(2^3)(2^4)$
- a. 2^7 b. 2^{12} c. 4^7 d. 4^{12} e. none of these
17. How many real roots does the following polynomial have: $x^4 - x^3 - 2x - 4 = 0$
- a. 0 b. 1 c. 2 d. 4 e. none of these
18. Which of the following is equivalent to $x^{\frac{m}{n}}$?
- a. $\sqrt[n]{x^m}$ b. $\sqrt[m]{x^n}$ c. $\left(\frac{1}{x}\right)^{m-n}$ d. all of these e. none of these
19. Solve for x: $x^2 - 2x - 8 = 6$
- a. 4, -2 b. $1 \pm \sqrt{15}$ c. $2 \pm \sqrt{15}$
- d. e. none of these
20. What is the numerator when the denominator is rationalized: $\frac{x}{\sqrt{x+4} + 2}$
- a. $\sqrt{x+4} + 2$ b. $\sqrt{x-4} - 2$ c. $\sqrt{x+4} - 2$
- d. $\sqrt{x+4} - 2x$ e. none of these

21. Simplify: $\frac{\sqrt{1 + \cot^2 x}}{\cot x}$
- a. $\frac{\sin x}{\cos^2 x}$ b. $\sec x$ c. $\sqrt{\tan x + \cot x}$
- d. $\sqrt{1 + \cot x}$ e. none of these
22. Complete the square of the following expression: $25y^2 - 100y + 75$.
- a. $25(y - 2)^2 - 25$ b. $25(y - 2)^2 - 97$ c. $(y - 2)^2 - 1$
- d. $25(y - 2)^2 - 1$ e. none of these
23. What is the range of the sine function?
- a. All real numbers less than 2π b. All real numbers from -1 to 1 , inclusive
- c. All real numbers except -1 and 1 d. All real numbers
- e. All real numbers between 0 and 2π
24. Find all solutions on the interval $[0, 2\pi)$ for the equation $2\sin^2 x = \cos x + 1$.
- a. $\frac{\pi}{6}, \pi, \frac{11\pi}{6}$ b. $\frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}$ c. $\frac{\pi}{3}, \pi, \frac{5\pi}{3}$
- d. $\frac{\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3}$ e. none of these
25. Given $\tan \theta = -\frac{2}{5}$ and $\frac{3\pi}{2} < \theta < 2\pi$ which of the following is true?
- a. $\sin \theta = \frac{2}{\sqrt{29}}$ b. $\sin 2\theta = \frac{20}{29}$ c. $\sec \theta = \frac{\sqrt{29}}{2}$
- d. $\cos 2\theta = \frac{25}{29}$ e. none of these