Sample Placement Exam 2

Name_____
        (print name)

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.   Find the equation of the line containing the point (-2 , 1) and parallel to the curve $2\,y - 3\,x = 5$.

    a. $y = \dfrac{2}{3}\,x + \dfrac{7}{3}$

    b. $y = \dfrac{3}{2}\,x - 2$

    c. $y = -\dfrac{2}{3}\,x - \dfrac{1}{3}$

    d. $y = \dfrac{3}{2}\,x + 4$

    e. none of these

2.   What is the numerator when the denominator is rationalized: $\dfrac{2}{h - \sqrt{h^2 - 4}}$

    a. $3h - 2$

    b. $2h + \sqrt{h^2 - 4}$

    c. $h + 2\sqrt{h^2 - 4}$

    d. $h + \sqrt{h^2 - 4}$

    e. none of these

3.   Multiply: $(x - 1)^2 \left(2x^2 - x + 1\right)$

    a. $2x^4 + 3x^3 - 3x^2 + x + 1$

    b. $2x^4 - 5x^3 + 5x^2 - 3x + 1$

    c. $2x^4 - x^3 - x^2 + x - 1$

    d. $2x^4 - x^3 + 3x^2 - x + 1$

    e. none of these

4.   For the piecewise function $f(x) = \begin{cases} -5 & \text{if } x < -2 \\ x^2 & \text{if } -2 \le x < 2 \\ x + 1 & \text{if } x \ge 2 \end{cases}$, find the value of:

    $2\,f(-3) - f(2) =$

    a. -13

    b. -11

    c. -8

    d. -7

    e. none of these

5. Which of the following is a factor of $y + 5xy + 3a + 15ax$.

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

6. Simplify: $\left(\dfrac{27\,x^{-4}\,y^{-3}\,z^{3}}{x^{5}\,y^{0}\,z^{-3}} \right)^{-\frac{1}{3}}$

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

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

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

8. Solve for x: $4x^{2}-2x-3=0$

        a. $\dfrac{-1\pm\sqrt{13}}{4}$ b. $\dfrac{-2\pm\sqrt{13}}{4}$ c. $\dfrac{1\pm\sqrt{13}}{4}$ d. $\dfrac{1\pm2\sqrt{13}}{4}$ e. none of these

9. Express as a single radical. $\dfrac{\sqrt[5]{(x-2)^{2}}\cdot\sqrt{x-2}}{\sqrt[4]{(x-2)^{3}}}$

        a. $\sqrt[24]{(x-2)^{7}}$ b. $\sqrt[20]{(x-2)^{3}}$ c. $\sqrt[11]{(x-2)^{6}}$ d. $\sqrt[10]{(x-2)^{7}}$ e. none of these

10. State the range of the function $f(x)=\sqrt{x-2}+1$ in interval notation.

        a. $(-\infty,\infty)$ b. $[\,0,\infty)$ c. $[\,1,\infty)$ d. $[\,2,\infty)$ e. none of these

11. Divide and simplify: $\dfrac{x^2 + 2xy + y^2}{x^3 - y^3} \div \dfrac{2x^2 + xy - y^2}{x^2 - y^2}$

a. $\dfrac{(x+y)^2}{(2x-y)(x^2 - xy + y^2)}$

b. $\dfrac{x^2 - y^2}{(x^2 - xy + y^2)(2x - y)}$

c. $\dfrac{(x+y)^2}{(x^2 + xy + y^2)(2x - y)}$

d. $\dfrac{(x+y)^2}{(x-y)^2(x^2 + xy + y^2)}$

e. none of these

12. Solve for x: $\dfrac{x - 3}{x(2 - x)} \geq 0$

a. $(-\infty, 0) \cup (2, 3]$

b. $(0, 2) \cup [3, \infty)$

c. $(-\infty, 0) \cup (0, 2)$

d. $[3, \infty)$

e. none of these

13. Simplify: $\dfrac{2^{-2} - x^{-2}}{x^{-1} - 2^{-1}}$

a. $\dfrac{x+2}{2x}$

b. $-\dfrac{(x+2)}{2x}$

c. $-(x+2)$

d. $\dfrac{x-2}{4-x}$

e. none of these

14. When $\dfrac{x - 3}{x^2 + 3x} - \dfrac{4x}{x^2 - 9}$ is simplified the numerator is:

a. $-3(x - 1)$

b. $-(x - 9)$

c. $-(9 + 3x^2)$

d. $1 - 4x$

e. none of these

15. Find the slope intercept form of the line that passes through the points (- 4 , 1) and (4 , - 5).

a. $y = -\dfrac{1}{2}x + 7$

b. $y = \dfrac{3}{4}x + 8$

c. $y = -\dfrac{3}{4}x - 2$

d. $y = -\dfrac{3}{4}x - 8$

e. none of these

16. Solve: $2\,|-4x+5\,| < 12$

    a. $\left(-\dfrac{1}{4},\dfrac{11}{4}\right)$ b. $\left(-\infty,\,-\dfrac{1}{4}\right)\cup\left(\dfrac{11}{4},\infty\right)$ c. $\left(-\dfrac{11}{4},\,\dfrac{1}{4}\right)$

    d. $\left(-\infty,-\dfrac{11}{4}\right)\cup\left(\dfrac{1}{4},\infty\right)$ e. none of these

17. What is the remainder when $3a^3 + 2a^2 - 3a - 1$ is divided by $a - 2$?

    a. -25 b. -11 c. 11 d. 49 e. none of these

18. Solve: $2x^2 - 3x \geq 5$

    a. $\left(-\infty,-1\right]\cup\left[\dfrac{5}{2},\infty\right)$ b. $\left(-\infty,-\dfrac{5}{2}\right]\cup\left[1,\infty\right)$ c. $\left[-1,\dfrac{5}{2}\right]$

    d. $\left(-\infty,0\right]\cup\left[\dfrac{3}{2},\infty\right)$ e. none of these

19. How many real roots does the following polynomial have: $x^5 - 2x^4 - x + 2 = 0$

    a. 0   b. 1   c. 3   d. 5   e. none of these

20. Express the domain of $f(x) = \dfrac{\sqrt{x+3}}{x^2 - 2x - 8}$ in interval notation.

    a. $[-3,2)\cup(2,4)\cup(4,\infty)$ b. $(-\infty,-3)\cup(-3,-2)\cup(-2,4)\cup(4,\infty)$

    c. $(-\infty,-2)\cup(-2,4)\cup(4,\infty)$ d. $[-3,-2)\cup(-2,4)\cup(4,\infty)$

    e. none of these

21. Find all solutions for the following equation on the interval $[0,2\pi)$.
$2\cos^2 x = \sin x + 1$

    a. $\dfrac{\pi}{2},\dfrac{7\pi}{6},\dfrac{11\pi}{6}$ b. $\dfrac{\pi}{3},\pi,\dfrac{5\pi}{3}$ c. $\dfrac{\pi}{3},\dfrac{2\pi}{3},\dfrac{3\pi}{2}$

    d. $\dfrac{\pi}{6},\dfrac{5\pi}{6},\dfrac{3\pi}{2}$ e. none of these

22. Given $\sec\theta = -\dfrac{x}{4}$ and $\dfrac{\pi}{2} < \theta < \pi$ which of the following is true?

    a. $\sin 2\theta = \dfrac{8(x^2-16)}{x^2}$ b. $\cos 2\theta = \dfrac{x^2-32}{x^2}$ c. $\sin 2\theta = \dfrac{2\sqrt{x^2-16}}{x}$

    d. $\cos 2\theta = \dfrac{16}{x^2}$ e. none of these

23. What is the domain of the tangent function?

    a. All real numbers except those betwee -1 and 1

    b. All real numbers except $\dfrac{\pi}{2} + k\pi$ where k is an int eger

    c. All real numbers except $k\pi$ where k is an int eger

    d. All real numbers

    e. All real numbers between 0 and 2π

24. Simplify: $\dfrac{1}{\sec x}\left(\tan x + \cot x\right)$

    a. $\cos x$ b. $\dfrac{1}{\sin x\ \cos^2 x}$ c. $\csc x$

    d. $\csc x \sec x$ e. none of these

25. Complete the square of the following expression: $16x^2 - 16x + 32$

    a. $(x-\frac{1}{2})^2 + \frac{7}{4}$ b. $16(x-\frac{1}{2})^2 - 2$ c. $16(x-\frac{1}{2})^2 + 28$

    d. $(x+\frac{1}{2})^2 + \frac{7}{4}$ e. none of these