King Fahd University of Petroleum & Minerals
Department of Math and Stat

Math 132 Semester 141 - Final Exam

Name______________________________________ ID No.________________________

1) $\lim\limits_{t\to 2} \dfrac{t^2 - t - 2}{t^2 + 3t - 10} =$

A) ∞ B) $\frac{3}{7}$ C) -1 D) $\frac{1}{5}$ E) $-\infty$

2) If $f(x) = \begin{cases} x + 1, & \text{if } x \ge 1 \\ x - 1, & \text{if } x < 1 \end{cases}$, then $\lim\limits_{x\to 1} f(x) =$

A) $-\infty$
B) 0
C) 2
D) ∞
E) does not exist

3) Let $f(x) = \dfrac{x^2 - 9}{x^2 + 2x + 1}$. The only value(s) of x for which f is discontinuous is (are)

A) -1.
B) -1, 1, -3, and 3.
C) -3 and 3.
D) -1 and 1.
E) 1, -3 and 3.

4) If $g(x) = x^4(2x - 1)^{10}$, then $g'(1) =$

A) 1. B) 80. C) 14. D) 24. E) 0.

5) If $2x^2 - xy + y^2 = 4$, then $\dfrac{dy}{dx} =$

A) $\dfrac{2y + 4x}{x}$. B) $x^2 = y^2$. C) $\dfrac{2(2x + y)}{x}$. D) $4x - 1 + 2y$. E) $\dfrac{y - 4x}{2y - x}$.

6) The function $f(x) = 4x^3 - 10x^2 - 8x + 3$ is decreasing on

A) $\left(-\frac{1}{3}, \infty\right)$. B) $\left(-\frac{1}{3}, 2\right)$. C) $\left(-\infty, \frac{1}{3}\right)$. D) $(2, \infty)$ E) $(-\infty, 2)$.

7) On the interval $[0, 2]$, the function $y = 3x^4 - 4x^3$ has

A) an absolute min. at $x = 1$ and no absolute max.
B) an absolute max. at $x = 2$ and an absolute min. at $x = 1$.
C) an absolute max. at $x = 2$ and an absolute min. at $x = 0$.
D) an absolute max. at $x = 0$ and an absolute min. at $x = 1$.
E) no absolute max. and no absolute min.

8) If $y = u^5 - 8u^2 + 2u - 1$ and $u = \sqrt{x + 10}$, find $\frac{dy}{dx}$ when $x = -9$.

A) $-\frac{9}{2}$ B) 0 C) 1 D) -1 E) -9

9) If $y = \ln\left(\frac{x^2 - 4x - 5}{x + 2}\right)$, then $\frac{dy}{dx} =$

A) $\left(\frac{x^2 - 4x - 5}{x + 2}\right)\left[\frac{x + 2}{x^2 - 4x - 5}\right]$.

B) $\frac{x + 2}{x^2 - 4x - 5}$.

C) $e\left[\ln(x^2 - 4x - 5) - \ln(x + 2)\right]$.

D) $\frac{x^2 - 4x - 5}{x + 2}\left[\frac{2(x - 2)}{x^2 - 4x - 5} - \frac{1}{x + 2}\right]$.

E) $\frac{2(x - 2)}{x^2 - 4x - 5} - \frac{1}{x + 2}$.

10) The function $y = x^4 - 8x^2$ has a relative maximum when $x =$

A) 2. B) -2. C) -1. D) 1. E) 0.

11) On the interval $[0, 2]$, the function $y = x^3 + 3x^2 - 9x + 27$ has an absolute maximum when $x =$

A) 2.
B) 0.
C) $\frac{1}{2}$.
D) 1.
E) none of the above

12) If $f(x) = e^x (x + 4)$, then f has an inflection point when $x =$

A) -1. B) -6. C) -3. D) -5. E) 0.

13) The function $f(x) = \frac{x^2 - 1}{x}$ is concave up on the interval(s)

A) $(-\infty, 0)$.
B) $(1, \infty)$.
C) $(0, \infty)$.
D) $(-\infty, -1)$.
E) $(-\infty, 0)$ and $(0, 1)$.

14) An equation of a horizontal asymptote for the graph of $y = \frac{3x^2 - 2}{x^2 - 4}$ is

A) $y = 3$. B) $y = 2$. C) $y = 0$. D) $x = 3$. E) $x = 2$.

15) An equation of a vertical asymptote for the graph of $y = \frac{7x^2 - 4}{2x + 3}$ is

A) $x = 0$.
B) $y = \frac{7}{2}$.
C) $x = -\frac{3}{2}$.
D) $y = -\frac{4}{3}$.
E) $x = 4$.

16) By using differentials, an approximation of ln(1.03) is

A) -0.01.
B) 0.01.
C) 0.02.
D) 0.03.
E) 0.04.

17) $\int \frac{x + 1}{(x^2 + 2x)^2}\, dx =$

A) $\frac{(x^2 + 2x)^3}{2} + C$

B) $\frac{(x^2 + 2x)^3}{6} + C$

C) $-(x^2 + 2x)^{-1} + C$

D) $-\frac{1}{2}(x^2 + 2x)^{-1} + C$

E) $\frac{(x^2 + 2x)^3}{3} + C$

18) If $y' = xe^{x^2}$ and $y(0) = \frac{7}{2}$, then $y =$

A) $e^{x^2} + \frac{7}{2}$
B) e^{x^2}
C) $2e^{x^2} + \frac{3}{2}$
D) $2e^{x^2} + \frac{7}{2}$
E) $\frac{1}{2}e^{x^2} + 3$

19) $\int_1^3 \frac{t^3 + 2}{t^2}\, dt =$

A) $-\frac{16}{3}$
B) $\frac{16}{3}$
C) $\frac{4}{3}$
D) $\frac{2}{9}$
E) $-\frac{4}{3}$

20) $\int_0^1 (x + 4)\sqrt[3]{x^2 + 8x - 1}\, dx =$

A) $\frac{33}{2}$
B) $\frac{45}{8}$
C) $\frac{33}{8}$
D) 0
E) $\frac{45}{2}$

21) $\int_1^2 \frac{2x - 3}{x^2 - 3x}\, dx =$

A) $\frac{1}{2}(4 - 3 \ln 2)$

B) $7 \ln 2$

C) e^5

D) 0

E) none of the above

22) If $\int_{e^2}^{e^4} \frac{k}{x}\,dx = 1$, then $k =$

A) $\frac{1}{4}$ B) 4 C) $\frac{1}{2}$ D) ln 2 E) 2

23) The exact area of the region bounded by the graphs of $y = x^2 - 4$, and the x-axis from $x = 0$ to $x = 4$ is

A) 16 sq units. B) $\frac{64}{3}$ sq units. C) $\frac{32}{3}$ sq units. D) 12 sq units. E) $\frac{16}{3}$ sq units.

24) The exact area of the region bounded by the graphs of $y = x^2 - 5$ and $y = 2x + 3$ is

A) $\frac{28}{3}$ sq units. B) $\frac{73}{3}$ sq units. C) 60 sq units. D) 24 sq units. E) 36 sq units.

25) $\int_{-1}^{0} xe^{-x}\,dx =$

A) $-1 - e$ B) $1 - e$ C) 1 D) $1 + e$ E) -1

26) Use the formula $\int \frac{du}{u\sqrt{u^2 + a^2}} = -\frac{1}{a}\ln\left|\frac{\sqrt{u^2 + a^2} + a}{u}\right| + C$ to find $\int \frac{dx}{x\sqrt{4x^2 + 1}}$.

A) $-\frac{1}{4}\ln\left|\frac{\sqrt{4x^2 + 1} + 1}{4x}\right| + C$

B) $-\ln\left|\frac{\sqrt{4x^2 + 1} + 1}{2x}\right| + C$

C) $-2\ln\left|\frac{\sqrt{4x^2 + 1} + 1}{2x}\right| + C$

D) $-\frac{1}{2}\ln\left|\frac{\sqrt{4x^2 + 1} + 1}{2x}\right| + C$

E) $-4\ln\left|\frac{\sqrt{4x^2 + 1} + 1}{4x}\right| + C$

27) If $f(x, y, z) = (2x + y^2 + z)^3$, then $\frac{\partial^3 f}{\partial z \partial y \partial x} =$

A) $2x + y^2 + z$ B) 0. C) $6(2x + y^2 + z)$ D) $3 + 2y$ E) $24y$

28) The number of critical points of $f(x, y) = x^3 + 3xy^2 + 3y^2 - 15x + 2$ is

A) 0. B) 1. C) 2. D) 3. E) 4.

29) The function $f(x, y) = x^2 + \frac{1}{3}y^3 + 2xy - 8y + 6$ has a relative minimum at

A) (-4, 4). B) (6, -6). C) (3, 6). D) (-3, 3). E) (2, -2).

30) A monopolist produces two products, *A*, and *B*. The joint-cost function is $c = 5q_A + 3q_B + 5000$ where c is the total cost of producing q_A units of *A* and q_B units of *B*. the demand functions for these products are given by $p_A = 205 - 2q_A - q_B$ and $p_B = 153 - q_A - q_B$, where p_A and p_B are the prices of *A* and *B*, respectively. The number of units of *A* and the number of units *B* that should be sold to maximize the monopolist's profit is

A) 75 units of *A* and 100 units of *B.*
B) 15 units of *A* and 25 units of *B.*
C) 10 units of *A* and 15 units of *B*.
D) 50 units of *A* and 75 units of *B.*
E) 25 units of *A* and 50 units of *B.*