MATH 106 Class Test (Code B)

Name: _____ **ID:** _____ **S.N.:** _____

Choose the correct answer. Each question is worth 1 points. No calculators.

Question No.	Student Answer

1. Find $\lim_{x \to 0} \dfrac{x^2 - 2x}{x}$.

   (a) -2

   (b) -1

   (c) 1

   (d) 2

   (e) 3

2. A candy company produces two varieties with demand $q_A = 5(p_B - p_A)$ and $q_B = 500 + 5(p_A - 2p_B)$. Find the prices that maximize profit.

   (a) $p_A = 80,\ p_B = 85$

   (b) $p_A = 70,\ p_B = 80$

   (c) $p_A = 79,\ p_B = 87$

   (d) $p_A = 90,\ p_B = 95$

   (e) $p_A = 92,\ p_B = 90$

3. If $F(x) = \dfrac{4x^2 + 3}{2x - 1}$, find $F'(1)$.

   (a) -6

   (b) 4

   (c) -8

   (d) 2

   (e) 8

4. If $y = 2u^2 - 3u - 2$ and $u = x^2 + 4$, find $\dfrac{dy}{dx}$ at $x = 1$.

   (a) 34

(b) 50

(c) 4

(d) 64

(e) 12

5. Find the tangent line to $f(x) = \ln(x^2 + 2x + 1)$ at $x = 0$.

   (a) $y = 2x$

   (b) $y = 2x + 1$

   (c) $y = e^x + 1$

   (d) $y = (\ln 2)x + 1$

   (e) $y = 2e^x + 1$

6. For $f(x, y) = x^2 + y^2 - xy + x^3$, the function has:

   (a) one relative minimum and one saddle point

   (b) only one relative maximum

   (c) one relative maximum and one saddle point

   (d) two relative minima

   (e) two relative maxima

7. For cost $c = q^3 - 40q^2$, the average cost is increasing when:

   (a) $q > 20$

   (b) $q < 20$

   (c) $q < 10$

   (d) $q > 10$

   (e) $q < 40$

8. Which statement is false for $f(x) = \dfrac{2x^3 + 1}{3x(2x - 1)(4x - 3)}$?

(a) No horizontal asymptote

(b) Vertical asymptote at $x = \frac{1}{2}$

(c) Vertical asymptote at $x = \frac{3}{4}$

(d) y-axis is a vertical asymptote

(e) Horizontal asymptote at $y = \frac{1}{12}$

9. If $\frac{dr}{dq} = 2000 - 20q - 6q^2$, find $p(q)$.

(a) $p = 2000 - 10q - 2q^2$

(b) $p = 2000 - q - q^2$

(c) $p = 200 - q^2$

(d) $p = 1000 - q - q^2$

(e) $p = 1000 - 10q - q^2$

10. Evaluate $\int 2xe^{x^2}\,dx$.

(a) $e^{x^2} + C$

(b) $2xe^{x^2} + C$

(c) $x^2e^{x^2} + C$

(d) $2x + C$

(e) $2x^2 + e^{x^2} + C$

11. Evaluate $\int \frac{3s^2}{s^3 + 5}\,ds$.

(a) $\ln|s^3 + 5| + C$

(b) $\ln|3s^2| + C$

(c) $\ln\left(\frac{s^3+5}{2s+1}\right) + C$

(d) $\frac{s^2}{3} + 5s + C$

(e) $\ln\left(\frac{3s}{s^2+5}\right) + C$

12. Evaluate $\displaystyle\int \frac{9x^2+5}{3x}\,dx$.

(a) $\frac{3}{2}x^2 + \frac{5}{3}\ln|x| + C$

(b) $3x + 5 + C$

(c) $3x^3 + 5x + C$

(d) $3x^2 + 5\ln|x| + C$

(e) $\frac{3}{2}x^3 + 5\ln|x| + C$

13. Marginal revenue $\frac{dr}{dq} = \frac{200}{(q+2)^2}$. Find $p(q)$.

(a) $p = \frac{100}{q+2}$

(b) $p = \frac{300}{(q+2)^2}$

(c) $p = \frac{200}{(q+2)^2}$

(d) $p = \frac{-100}{(q+2)^2}$

(e) $p = \frac{300}{q(q+2)}$

14. Evaluate $\displaystyle\int_{-1}^{3} (3x^2 - 2x + 6)\,dx$.

(a) 44

(b) 34

(c) -8

(d) 49

(e) 58

15. For $f(x) = 3x^5 - 5x^3$, the relative maximum occurs at:

(a) $x = -1$

(b) $x = 0$

(c) $x = 2$

(d) $x = 3$

(e) $x = -4$

16. Area between $y = x^2$ and $y = 2x$ is:

(a) $\frac{4}{3}$

(b) $\frac{1}{2}$

(c) 2

(d) $\frac{2}{3}$

(e) $\frac{3}{8}$

17. Evaluate $\int_0^1 x^2 e^x \, dx$.

(a) $e - 2$

(b) e^2

(c) $e^2 + 1$

(d) $e^2 - 1$

(e) $e + 1$

18. Evaluate $\int_1^e x \ln x \, dx$.

(a) $\frac{1}{4}(e^2 + 1)$

(b) $\frac{1}{2}(e + 1)$

(c) e^2

(d) $-4e^2$

(e) $-2e$

19. For $f(x,y) = x^3y^2 + x^2y - x^2y^2$, compute $f_{xxy}(2,3)$.

(a) 62

(b) 6

(c) 2

(d) 72

(e) 24

20. Using $\displaystyle\int \frac{du}{u^2\sqrt{a^2-u^2}} = -\frac{\sqrt{a^2-u^2}}{a^2u} + C$, evaluate $\displaystyle\int \frac{dx}{x^2\sqrt{4-9x^2}}$.

(a) $-\frac{\sqrt{4-9x^2}}{4x} + C$

(b) $-\frac{\sqrt{9-4x^2}}{2x} + C$

(c) $-\frac{\sqrt{4-9x^2}}{6x} + C$

(d) $-\frac{\sqrt{4-9x^2}}{3x} + C$

(e) $-\frac{\sqrt{4-9x^2}}{9x} + C$