Math 12, Spring 2012, Exam 2 Name: _____
Place answers on scantron.

(1) What is the derivative of $\ln(e^x + 1)$?

(A) $\frac{1}{e^x + 1}$ (B) $\frac{e^x}{e^x + 1}$ (C) 1 (D) $\frac{e^x + 1}{e^x}$

(2) Find the equation of the tangent line to the curve $y = 3e^{5x} + e^{-x}$ for the point where $x = 0$.

(A) $y = 14x + 4$ (B) $y = 4x + 4$ (C) $y = 2x - 4$ (D) $y = 2x + 4$

(3) What is the derivative of $3^x \cdot \ln x$?

(A) $(\ln 3)3^x \ln x$ (B) $(\ln 3)3^x + \frac{3^x}{x}$

(C) $3^x \ln x + \frac{3^x}{x}$ (D) $(\ln 3)3^x \ln x + \frac{3^x}{x}$

(4) Use the table below to find the value of $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right)$ at $x = 2$.

| $x$ | –1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|
| $f(x)$ | 3 | 3 | 1 | 0 | 1 |
| $g(x)$ | 1 | 2 | 2.5 | 3 | 4 |
| $f'(x)$ | –3 | –2 | –1.5 | -1 | 1 |
| $g'(x)$ | 2 | 3 | 2 | 2.5 | 3 |

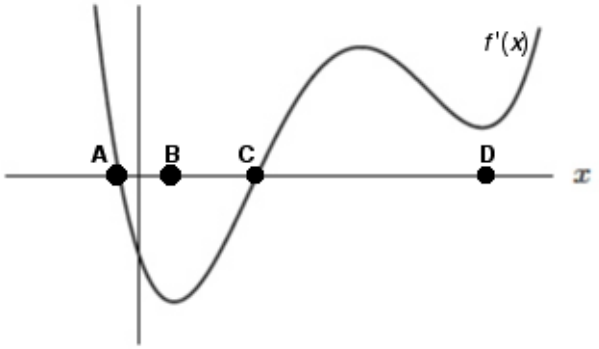
(A) 1 (B) $-1$ (C) $-\frac{1}{3}$ (D) $\frac{1}{3}$

(5) Use the table in problem 4 to find the value of $\frac{d}{dx}(f(g(x))$ at $x = 0$.

(A) –3 (B) 3 (C) –1 (D) 1

(6) The following figure is the graph of the derivative of the function $f(x)$. Which value of $x$ is that for a local minimum of $f(x)$?

(A) A (B) B (C) C (D) D




(7) The function $f(x) = x^2 e^{ax}$ has a critical point at $x = -1$ for which value of $a$?

(A) $a = 1$ (B) $a = 3$ (C) $a = 2$ (D) $a = 0$

(8) The function $f(x) = 2x^3 - 3x^2 - 36x + 7$ has an inflection point for what value of $x$?

(A) $x = \frac{1}{2}$ (B) $x = 1$ (C) $x = 0$ (D) $x = \frac{1}{3}$

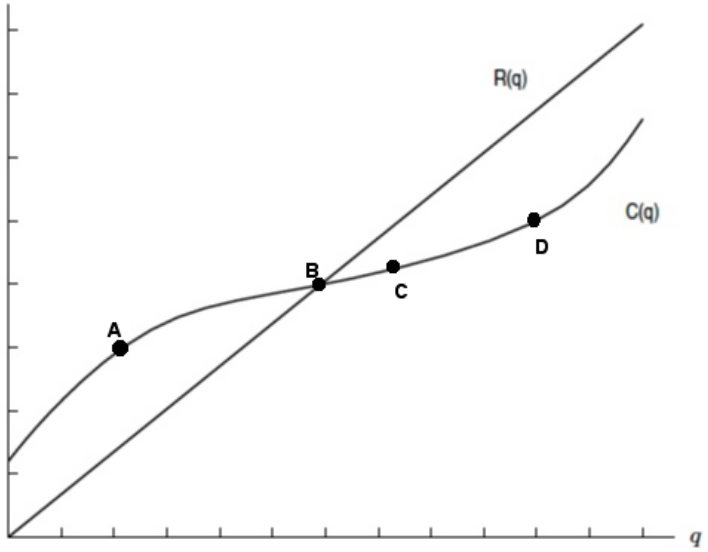
(9) The production level that maximizes profit, as given by the following table is

| $q$ | 0 | 10 | 20 | 30 | 40 |
|---|---|---|---|---|---|
| $MR$ | 100 | 100 | 100 | 100 | 100 |
| $MC$ | 40 | 75 | 100 | 120 | 150 |
| | | | | | |

(A) $q = 10$ (B) $q = 20$ (C) $q = 30$ (D) $q = 40$

(10) The following graph shows revenue $R(q)$ and cost $C(q)$. At which point on the cost function is the average cost $\frac{C(q)}{q}$ a minimum?

(A) A (B) B (C) C (D) D




(11) At which point shown in the graph in problem 10 is the profit a minimum?

(A) A (B) B (C) C (D) D

(12) The demand curve for a product is $q = 2000 - 3p^2$. Find the elasticity of demand at price $p = 8$, and determine whether it is elastic or inelastic.

(A) $E = 1.212$, demand is elastic (B) $E = 1.212$, demand is inelastic

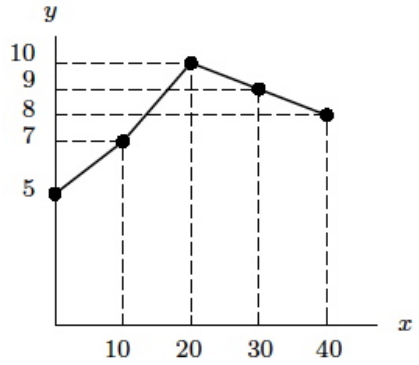
(C) $E = 0.212$, demand is elastic (D) $E = 0.212$, demand is inelastic

(13) The following table shows the number of students who have joined a club $t$ days after it was formed. Assuming this data is modeled by the logistic model, the maximum number of students who will probably become members is approximately

(A) 70 (B) 205 (C) 252 (D) 410

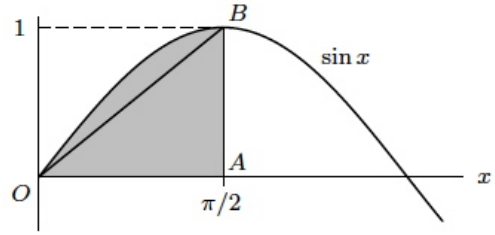
| $t$ (days) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| $P$ (number of students) | 4 | 9 | 18 | 36 | 70 | 126 | 205 | 296 | 375 |

(14) The rate of pollution pouring into a lake is measured every ten days, with results in the following table. Average the Left Hand and Right Hand sums to find the amount of pollution that entered the lake during the first 40 days. $x$ is the number of days, and $y$ is the number of tons per day.




(A) 310 (B) 325 (C) 340 (D) 400

(15) Which of the following best approximates $\frac{2}{\pi}\int_0^{\frac{\pi}{2}} \sin t\, dt$ ?




(A) 0.4 (B) 0.5 (C) 0.6 (D) 1.0

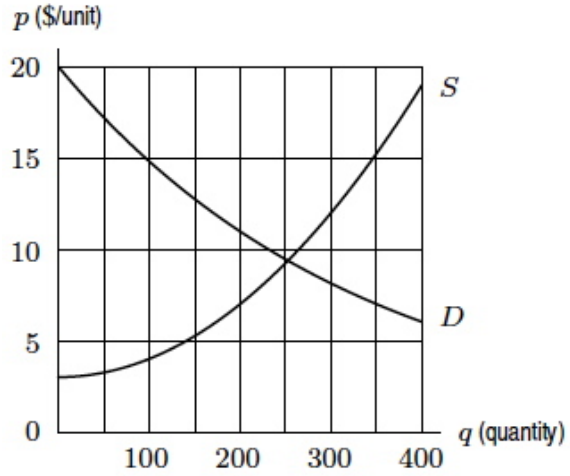
(16) A stamp collector has 4500 stamps in his collection on Jan. 1, and is collecting stamps at the rate of $f(t)$ stamps per week. Which integral shows the number of stamps in his collection at the end of the year?

(A) $\int_0^{52} f(t)dt$ (B) $4500 + \int_0^{52} f'(t)dt$

(C) $4500 + \int_0^{365} f(t)dt$ (D) $4500 + \int_0^{52} f(t)dt$

(17) The figure below shows the supply (S) and demand (D) curves for a product. Which amount is closest to the producer surplus?

(A) \$1000 (B) \$1125 (C) \$2000 (D) \$2125




(18) Evaluate the integral $\int (3x^3 + \frac{1}{x} + \frac{2}{x^2})dx$

(A) $\frac{3}{4}x^4 + \ln x - \frac{2}{x} + C$ (B) $4x^4 + \ln x + \frac{2}{x} + C$

(C) $\frac{3}{4}x^4 + \frac{1}{x^2} + \frac{2}{x^3} + C$ (D) $\frac{3}{4}x^4 + \ln x - \frac{1}{x} + C$