

BARUCH COLLEGE
MATH 2205 Practice Final 1, Part 1, NO CALCULATORS

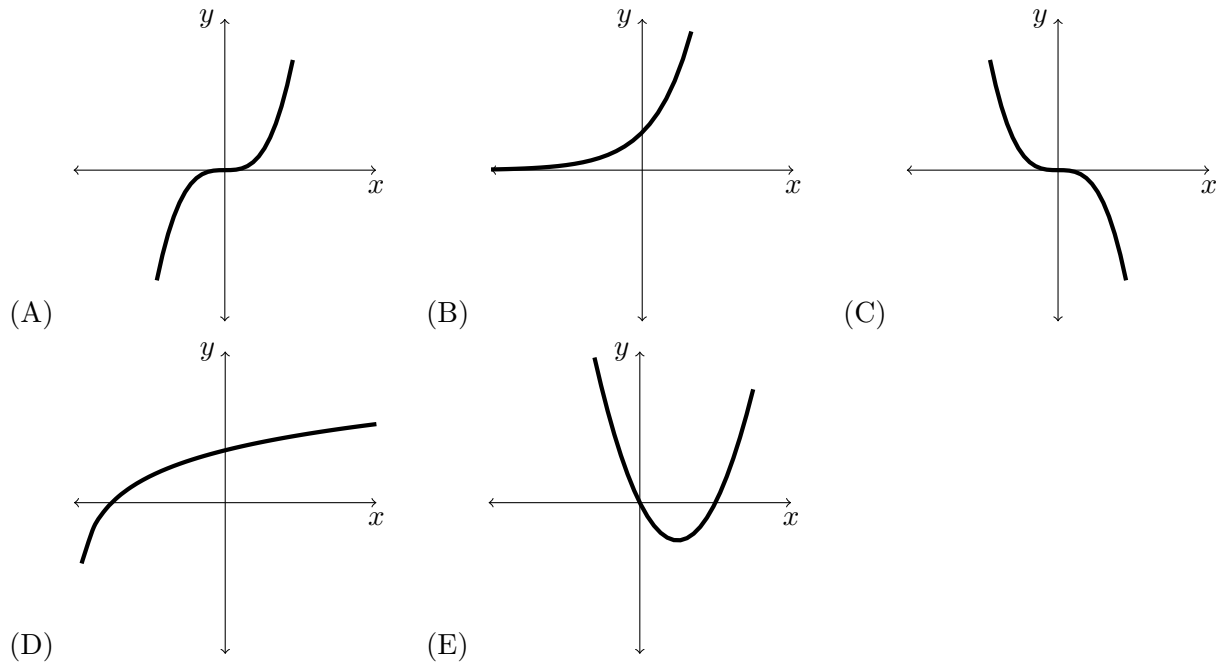
1. If $y = x^{\frac{3}{2}}$ then dy , the differential of y , as x changes from 64 to 64.1 is given by 1. _____

(A) 12 (B) 1.2 (C) 51.2 (D) 1.5 (E) 0.1

2. Find the critical numbers of $f(x) = \sqrt{4 - x^2}$. 2. _____

(A) $x = -4, 0, 4$ (B) $x = -4, 4$ (C) $x = -2, 2$
(D) $x = -2, 0, 2$ (E) There are no critical numbers

3. If, for all real numbers x , $f'(x) > 0$ and $f''(x) < 0$, which of the following curves could be a part of the graph of $f(x)$? 3. _____



4. If $f(x) = x \ln(x^2)$, then $\frac{dy}{dx} =$ 4. _____

(A) $\ln(x^2) + 2$ (B) $\frac{1}{x^2}$ (C) $\frac{2}{x}$ (D) $\ln(x^2) + \frac{1}{x}$ (E) $4 \ln(x)$

5. The **approximate** area between the graph of $y = x^2 + 2$ and the x -axis between $x = 1$ and $x = 4$, using 3 rectangles of equal width and the **RIGHT-HAND** endpoints, is: 5. _____
- (A) 35 (B) 38 (C) 20 (D) 14 (E) 29
6. $\int \frac{6x^2 + 8x + 2}{x^3 + 2x^2 + x} dx =$ 6. _____
- (A) $\frac{12x + 8}{3x^2 + 4x + 1} + C$ (B) $\ln|x^3 + 2x^2 + x| + C$ (C) $\frac{2x^3 + 4x^2 + 2x}{\frac{x^4}{4} + \frac{2x^3}{3} + \frac{x^2}{2}} + C$
- (D) $\frac{1}{2} \ln|x^3 + 2x^2 + x| + C$ (E) $2 \ln|x^3 + 2x^2 + x| + C$
7. The demand curve for a product is given by $x = 1000 - 4p^2$, where p is the price. Find the elasticity of demand if $p = 10$. 7. _____
- (A) $\frac{-3}{4}$ (B) $\frac{-4}{3}$ (C) $\frac{-1}{4800}$ (D) -2 (E) $\frac{-1}{2}$
8. The average value of $f(x) = \frac{1}{\sqrt{x}}$ on the closed interval $[1, 4]$ is 8. _____
- (A) $\frac{-1}{6}$ (B) $\frac{1}{6}$ (C) 6 (D) $\frac{8}{3}$ (E) $\frac{2}{3}$
9. For what value of k will $y = 3x^2 + kx - 5$ have a minimum at $x = -2$? 9. _____
- (A) $k = 10$ (B) $k = 0$ (C) $k = 12$ (D) $k = \frac{7}{2}$ (E) Does not have a minimum value

10. An object moving on a line has velocity given by the equation $v(t) = 3t^2 + t$, for $t \geq 0$. At time $t = 2$, the object's position is $s(2) = 3$. Find the function describing the position, $s(t)$, at any time t . 10._____

- (A) $s(t) = t^3 + \frac{1}{2}t^2 - 7$ (B) $s(t) = 6t - 9$ (C) $s(t) = t^3 + \frac{1}{2}t^2$
 (D) $s(t) = 3t^2 + t - 11$ (E) $s(t) = 6t + 1$

11. The function $f(x) = x^3 - 6x^2 + 9x - 4$ has a relative **maximum** at 11._____

- (A) $x = 0$ (B) $x = 1$ (C) $x = 2$ (D) $x = 3$ (E) $x = 4$

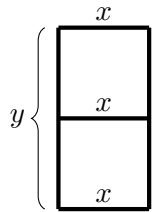
12. If $f(x) = e^{\frac{2}{x}}$, then $f'(x) =$ 12._____

- (A) $2e^{\frac{2}{x}} \ln(x)$ (B) $e^{\frac{2}{x}}$ (C) $e^{\frac{-2}{x^2}}$ (D) $-\frac{2}{x^2}e^{\frac{2}{x}}$ (E) $-2x^2e^{\frac{2}{x}}$

13. Let $f(x) = x^5 + x$ and let $g(x)$ be the inverse of $f(x)$. Then $g'(2) =$ 13._____

- (A) $-\frac{1}{6}$ (B) $\frac{1}{6}$ (C) $\frac{1}{81}$ (D) 6 (E) 81

14. A window is to be made with a frame as shown. If the total length of the frame is to be 120 feet, which of the following should be solved to **maximize the area** of the window? 14._____



- (A) Maximize $3x + 2y$, subject to the constraint $xy = 120$
 (B) Maximize xy , subject to the constraint $3x + 2y = 120$
 (C) Maximize $x + y$, subject to the constraint $3x + 2y = 120$
 (D) Minimize xy , subject to the constraint $3x + 2y = 120$
 (E) Minimize $3x + 2y$, subject to the constraint $xy = 120$

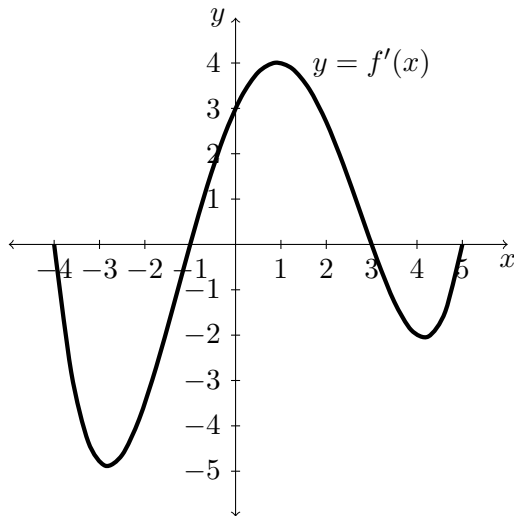
15. Find the absolute **maximum** value of $f(x) = x^3 - 3x^2$ on the interval $-1 \leq x \leq 1$. 15._____

(A) -4 (B) 4 (C) 0 (D) -2 (E) 2

16. The solution of the differential equation $\frac{dy}{dx} = \frac{3x}{y}$, $y \neq 0$, with the initial condition $y(0) = 1$ is: 16._____

(A) $y = 3e^{\frac{x^3}{2}}$ (B) $y = e^{\frac{x^3}{2}}$ (C) $y = \frac{3x^2 + 1}{2}$ (D) $y = \frac{3x^2}{2} + 1$ (E) $y = \sqrt{3x^2 + 1}$

17. The graph of f' (the **derivative** of the function f) is shown below for $-4 \leq x \leq 5$. On which intervals is the graph of the **function**, f , *increasing*? 17._____



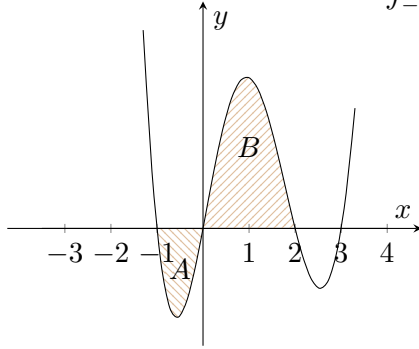
- (A) $-1 < x < 3$ only
 (B) $-3 < x < 1$ and $3 < x < 5$
 (C) $-3 < x < 1$ and $4 < x < 5$
 (D) $-4 < x < -3$ and $1 < x < 4$
 (E) $-3 < x < 1$ only

18. Solve the following logarithmic equation for x : $\log_2(x) + \log_2(x + 2) = 3$ 18._____

(A) $x = -4, 2$ (B) $x = 2$ only (C) $x = -3, 1$ (D) $x = 1$ only (E) No solution

19. The graph of $y = f(x)$ is shown below. Given that the area of region A is 1, the area of region B is 3 and $\int_{-1}^3 f(x)dx = \frac{3}{2}$, what is $\int_2^3 f(x)dx$?

19. _____



- (A) $-\frac{1}{2}$ (B) $-\frac{5}{2}$ (C) -1 (D) 1 (E) $-\frac{1}{4}$

20. Evaluate $\sum_{i=2}^5 i(i+1)$.

20. _____

- (A) 58 (B) 68 (C) 70 (D) 30 (E) 24

21. If $f(x) = \frac{x+2}{x}$, find the inverse function, $f^{-1}(x)$.

21. _____

- (A) $f^{-1}(x) = x + 2 \ln x$ (B) $f^{-1}(x) = \frac{2}{x+1}$ (C) $f^{-1}(x) = \frac{2}{x}$
 (D) $f^{-1}(x) = \frac{x}{x+2}$ (E) $f^{-1}(x) = \frac{2}{x-1}$

22. If $f(x) = e^x$ and $g(x) = \ln(x+1)$, then $f(g(x)) =$

22. _____

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

23. The graph of $y = x^4 - 6x^3 + 12x^2 + 4x + 4$ is concave **downward** whenever

23. _____

- (A) $-\infty < x < \infty$ (B) $1 < x < 2$ (C) $-\infty < x < 1$ or $2 < x < \infty$
 (D) $x < 1$ only (E) $x > 2$ only

24. $\int_0^1 e^{2x} dx =$ 24. _____

- (A) $\frac{e^2 - 1}{2}$ (B) $\frac{e^2}{2}$ (C) e^2 (D) $e^2 - 1$ (E) $\frac{e^3 - 1}{2}$

25. Let $f(x)$ be the function defined by $f(x) = \sqrt{4+x}$. Linearize $f(x)$ near $x = 0$, and then use this to approximate $f(0.12)$. 25. _____

- (A) 2.3 (B) 2.03 (C) 2.04 (D) 4.03 (E) 0.37

BARUCH COLLEGE
MATH 2205, Practice Final 1, Part 2, CALCULATORS ALLOWED

26. The position function of a particle is given by $s = t^3 - 1.5t^2 - 2t$, for $t \geq 0$. 26._____
At what value of t does the particle reach a velocity of 166 *m/sec*?
- (A) $t = 7$ sec (B) $t = 8$ sec (C) $t = 5$ sec (D) $t = 3$ sec (E) $t = 12$ sec
27. The function $y = \frac{3x^2 + x - 2}{e^x}$ has a horizontal tangent line when: 27._____
- (A) $x = -3$ and $x = 1.125$ (B) $x = -0.468$ and $x = 2.135$ (C) $x = -1$ and $x = 0.667$
(D) $x = -0.415$ and $x = 2.278$ (E) Never
28. The total cost $C(x)$, in dollars, of producing x items is given by 28._____
 $C(x) = 0.01x^3 - 0.6x^2 + 13x$. What is the maximum profit if each item is sold for \$6? (Assume that everything produced is sold.)
- (A) \$63.03
(B) \$23.03
(C) \$58.56
(D) \$17.82
(E) There is no maximum profit.
29. The half-life of a radioactive substance is 100 years. How many years does 29._____
it take until only 15% of the original amount remains?
- (A) 273.7 years (B) 135.0 years (C) 282.9 years (D) 723.5 years (E) 215.1 years
30. The population of Anytown was 100,000 on January 1, 2016 and is growing 30._____
at a continuous yearly growth rate of 4.5%. In what year will the population reach 200,000?
- (A) 2028 (B) 2031 (C) 2034 (D) 2037 (E) 2040

31. If interest is charged at a nominal rate of 15.8% compounded daily (365 days in a year), how much will \$10,000 accumulate to after 2 years? Answer to the nearest dollar. 31._____
- (A) \$13,160 (B) \$10,009 (C) \$13,715 (D) \$14,102 (E) \$12,876

32. The table below shows the monthly text messages in billions for the years 2010 to 2015. 32._____

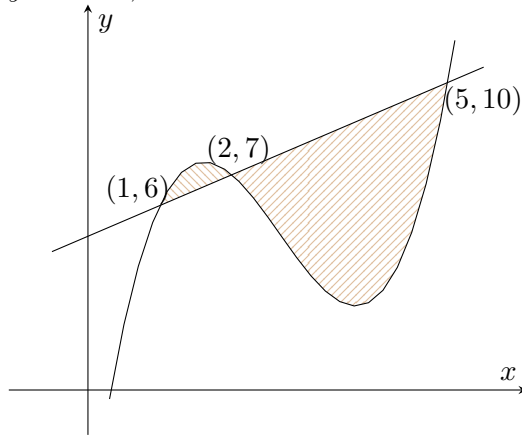
Year	Monthly Text Messages (billions)
2010	0.9
2011	1.0
2012	2.1
2013	8.3
2014	14.2
2015	28.9

Using the year 2010 as the reference year (year zero), find the exponential function that best fits this data, and from that function estimate the number of text messages in 2017.

- (A) 33.1 billion
(B) 42.4 billion
(C) 127.5 billion
(D) 133.2 billion
(E) 141.6 billion
33. Given the demand curve $p = 35 - x^2$ and the supply curve $p = 3 + x^2$, find the producer surplus when the market is in equilibrium. 33._____
- (A) 21.4 (B) 42.7 (C) 46.4 (D) 76.1 (E) 91.1
34. The cost function is given by $C(x) = 2x^2 - 3x + 5$, where x is the number of items produced. For what value of x is the AVERAGE cost function minimized? 34._____
- (A) $x = 1.50$ (B) $x = 5.00$ (C) $x = 1.73$ (D) $x = 1.39$ (E) $x = 1.58$

35. What is the area enclosed by the graphs of $y = x^3 - 8x^2 + 18x - 5$ and $y = x + 5$, shown below?

35. _____



The curves intersect at $(1, 6)$, $(2, 7)$ and $(5, 10)$.

- (A) 10.667 (B) 11.833 (C) 14.583 (D) 21.333 (E) 32

1. B
2. D
3. D
4. A
5. A
6. E
7. B
8. E
9. C
10. A
11. B
12. D
13. B
14. B
15. C
16. E
17. A
18. B
19. A
20. B
21. E
22. E
23. B
24. A
25. B
26. B
27. B
28. A
29. A
30. B
31. C
32. D
33. B
34. E
35. B