

Mock-MATH12 T3 E

Mathematics Grade12 90 minutes



ADEC Examination 2016-2017

Read the following instruction first:

1. Write your data inside the frame before you start answering the exam.
2. Use a blue pen.
3. The exam paper contains **(10)** pages and consists on **(22)** questions.
4. Read each question well and give one answer only.
5. The mark between [] refers to question's mark.
6. All given diagram are approximately drawn.
7. For Multiple Choice questions, circle the symbol of the correct answer, and if you would like to change your answer later, cross the wrong answer and circle the new one.
8. For open-ended questions, write your answer on the lines or in the space provided.

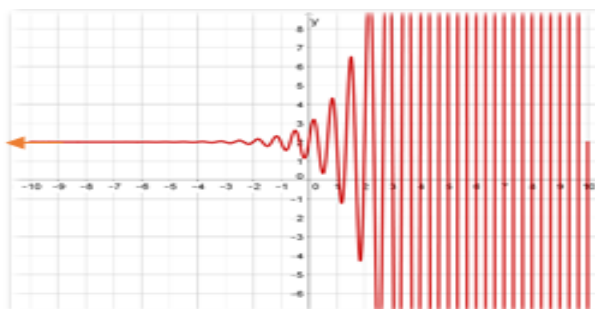
Question 1:

20

Choose the correct answer and indicate your choice by circling ONE letter that corresponds to the answer.

1) In the following graph, which represents the function f , find $\lim_{x \rightarrow -\infty} f(x)$

- a) $-\infty$
- b) 2
- c) ∞
- d) does not exist



[2]

2) If $\lim_{x \rightarrow \infty} \frac{ax^4 + 3x^2}{5x^4 - 1} = 2$ then the value of the constant a is

- a) 0
- b) 2.5
- c) 10
- d) ∞

[2]

3) Find $\lim_{n \rightarrow -2} \left(\frac{n^2 - n - 6}{n + 2} \right)$

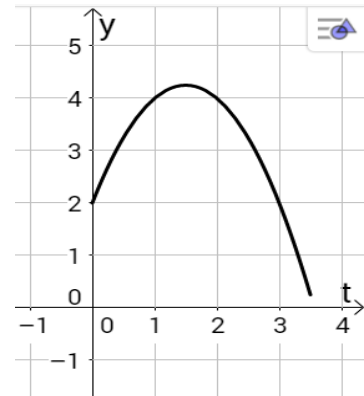
- a) -6
- b) -5
- c) 5
- d) does not exist

[2]

4) An object moving by the function of $y = s(t)$ is represented by the graph below, where $s(t)$ in feet, t in seconds. Find the average velocity between $t=0$ and $t=1$?

[2]

- a) - 2
- b) $-\frac{1}{2}$
- c) $\frac{1}{2}$
- d) 2



5) What is the derivative of $f(x) = \frac{2}{x^4}$?

[2]

- a) $f'(x) = \frac{-8}{x^3}$
- b) $f'(x) = \frac{8}{x^3}$
- c) $f'(x) = \frac{-8}{x^5}$
- d) $f'(x) = \frac{8}{x^5}$

6) What is the slope of the line tangent to the graph of $y = \sqrt[3]{x^4}$ at $(-1, 1)$?

[2]

- a) $-\frac{4}{3}$
- b) $\frac{3}{4}$
- c) 1
- d) $\frac{4}{3}$

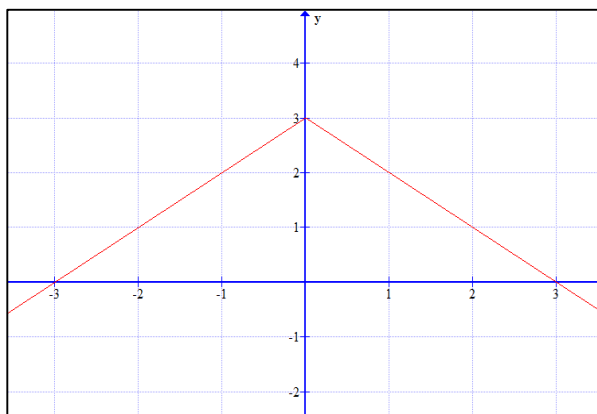
7) If $f(x) = x^2 g(x)$, $g(1) = 7$, $f'(1) = 11$. So $g'(1)$ is equal to?

- a) 14
- b) 11
- c) -3
- d) -21

[2]

8) Use the graph of $f(x)$ to find $\lim_{n \rightarrow \infty} (\sum_{i=1}^n f(x_i) \Delta x_i)$ on the interval $[-3, 3]$?

- a) 3
- b) 4.5
- c) 6
- d) 9



[2]

9) If $\int_0^1 kx^2 dx = 9$ then find the value of the constant k ?

- a) $\frac{9}{2}$
- b) 8
- c) 9
- d) 27

[2]

10) If $F(x)$ is the antiderivative of a continuous function $f(x)$. Then find $\int_b^a f(x) dx$?

- a) $f(a) - f(b)$
- b) $f(b) - f(a)$
- c) $F(a) - F(b)$
- d) $F(b) - F(a)$

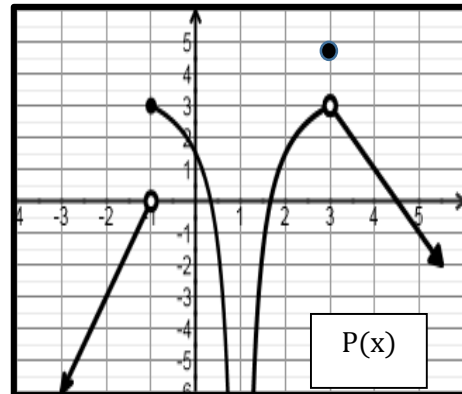
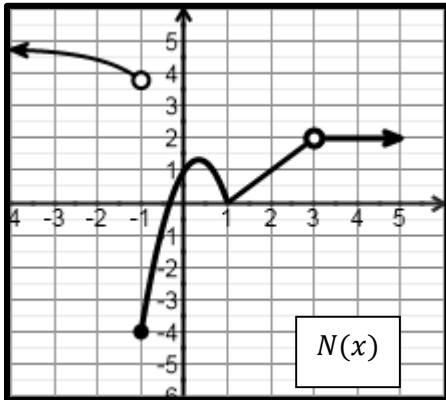
[2]

Question 2:

11) Based on the following graphs that represent the functions $N(x)$ and $P(x)$.

Answer the following questions?

[10]



- (a) $\lim_{x \rightarrow -1^+} P(x)$
- (b) $\lim_{x \rightarrow -1} N(x)$ because
- (c) $\lim_{x \rightarrow 1} N(x)$
- (d) $\lim_{x \rightarrow 1} P(x)$
- (e) $\lim_{x \rightarrow 3} (P(x) + N(x))$
- (f) $\lim_{x \rightarrow \infty} N(x)$
- (g) $\lim_{x \rightarrow a} P(x) = 3$ IF Then all values of the constant a
- (h) IF $\lim_{x \rightarrow c} N(x) = 5$ Then the constant $c =$

Evaluate each limit.

[3]

12) $\lim_{x \rightarrow 1} \frac{x^3 - x^2 + x - 1}{x - 1}$

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13) $\lim_{x \rightarrow 2} \frac{x^{\frac{2}{x}-1}}{x-2}$

[3]

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14) $\lim_{x \rightarrow 9} \frac{\sqrt{x}-3}{x^2-9x}$

[4]

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Question 3:

22

15) The function $N(t) = \frac{15+6000t^3}{1+t^2+20t^3}$ represents the number of students applying for Olympiad competition in mathematics in Abu Dhabi after **t** year from the start of the competition.

[3]

a) What is the number of the students applying at the beginning?

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b) What is the maximum possible number of students applying for the competition?

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16) Use limits to find the an equation for the slope of the graph of $y = x^2 + 1$ at any point ?

[4]

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17) Let $g'(1) = 6$, $g(1) = 4$, find $h'(1)$ for each functions

[7]

a) $h(x) = x^3 - g(x) + e^2$

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b) $h(x) = \frac{3x + 1}{g(x)}$

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c) $h(x) = \sqrt{x} g(x)$

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18) A rocket has been fired vertically upward with a velocity **96 ft/s**, suppose the rocket elevation **s(t)** in feet, t in seconds is given by the function $s(t) = -16t^2 + 96t + 15$ answer the following

a) Find an equation for the instantaneous velocity v(t) of the rocket?

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b) Find the instantaneous velocity v(t) of the rocket after 4 seconds, and determine the direction of the rocket at this moment?

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c) What is the maximum height that the rocket will reach?

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Question 4:

38

19) The temperature of a city is given in fahrenheit (°F) in one day by the function

$$h(t) = -0.0036t^3 - 0.01t^2 + 2.4t + 52 ,$$

where t is the number of hours passed to the nearest hour.

[10]

a) What is the temperature at the beginning of the day?

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b) Find an equation for the instantaneous rate of change for the temperature?

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c) Find the minimum temperature on the interval $[0,24]$?

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d) Hessa said the highest temperature was at 16 (°F) , Sheikha said that it was at 14 (°F) in the same day. Who is correct? Justify?

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20) If $\int_0^1 ax \, dx = \int_0^3 x^2 \, dx$, find the value of the constant a ?

[4]

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21) Evaluate each integral.

[11]

a) $\int_1^3 (3x^2 - 6) dx$

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b) $\int_t^{t^3} 10x dx$

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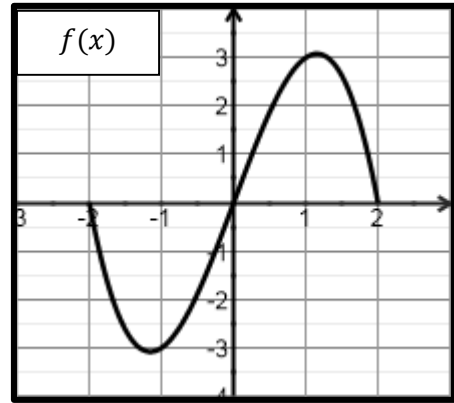
c) $\int (x\sqrt{x} - \frac{5}{x^6} + \pi^2) dx .$

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22) The following graph represents the curve $f(x) = 4x - x^3$

a) Approximate the area between the curve $f(x)$ and the x-axis on the interval $[0,2]$ using the right end points of the rectangles.

Use rectangles with a width of $\frac{1}{2}$?



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b) Use the definite integral to find the area of region between the graph of $f(x) = 4x - x^3$ and the x-axis on the interval $[0,2]$

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