# Midterm Exam 08/11/2021

• This is a preview of the published version of the quiz

Started: Nov 8 at 8:22pm

# **Quiz Instructions**

Functions to type in if needed:

sqrt(x): square root function; \infty: infinity

sin(x): sine function; -\infty: minus infinity

cos(x): cosine function; (a,b)U(c,d): union of intervals

e^(x): exponential function; \theta: angle theta

In(x): logarihtmic function; \pi: the number pi

<=: less equal than; >=: greater equal than

#### **Question 1**

2 pts

Find the constant C of the antiderivative f, if  $f'(x)=e^{x/3}+20(1+x^2)^{-1}$  with f(0)=2.

## **Question 2**

3 pts

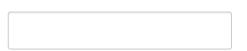
Use the Newton's approximation method to find the root (correct to 5 decimal places) of the equation  $x^3 - 2x + 3 = 0$  with the initial x = -2.

**Question 3** 

3 pts

Find the point on the parabola  $y^2=2x$  that is closest to the point  $A\left(1,\frac{27}{2}\right)$ .

Hint: Type your answer in the form (x, y) of an ordered pair.



**Question 4** 

Suppose the function  $g(x)=200+8x^3+x^4$ . Give the first and second derivative in a simplified form.

Hint: Type in your answer in the form  $g'(x)=ax^b(A-x)(B-x)(C+x)$ ;  $g''(x)=ax^b(A-x)(B-x)(C+x)$ 

### **Question 5**

2 pts

Suppose the function  $g(x)=200+8x^3+x^4$  . Find the intervals of increase or decrease.

Hint: Type in your answer in the form decrease in (a,b); increase in (c,d)



## **Question 6**

Suppose the function  $g(x)=200+8x^3+x^4$  . Find the inflection points (IP) and the intervals of concavity.

Hint: Type in your answer in the form IP: x,y; concave up in (a,b); concave down in (c,d)



#### **Question 7**

2 pts

Suppose the function  $g(x)=200+8x^3+x^4$  . Find the local maximum and minimum values.

Hint: Type in your answer in the form maximum: (x,f(x)); minimum: (x,f(x)) or minimum: does not exist



#### **Question 8**

An object with weight W is dragged along a horizontal plane by a force acting along a rope attached to the object. If the rope makes an angle with the plane, then the magnitude of the force is  $F=\frac{\mu W}{\mu\sin(\theta)+\cos(\theta)}$ , where \mu is a positive constant called the *coefficient of friction* and where  $0\leq\theta\leq\pi/2$ . Determine the type of the critical point  $\tan(\theta)=\mu$ .

- $\Box F'' = W \sin(\theta) < 0$ , minimum

Question 9

If f is odd, then f' is even.  $\bigcirc$  True  $\bigcirc$  False

**Question 10** 

Find the limit  $\lim_{u o 2} rac{\sqrt{4u+1}-3}{u-2}$  .

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2 pts

Find y' if  $x^3 + y^4 = 3xy$ .

$$\bigcirc \ y'=rac{3(x^2-y)}{3x-4y^3}$$

$$\bigcirc \ y' = rac{3(x^2 - y^2)}{3x - 4y^2}$$

$$\bigcirc \ y'=rac{2(x^2+y)}{3x-4y^3}$$

$$\bigcirc \ y'=rac{3(x^2-2y)}{3x-2y^3}$$

Question 12 2 pts

Find the tangent to  $x^3 + y^4 = 3xy$  at the point (3,3).

$$\bigcirc 12y = -5x + 31$$

$$y = \frac{1}{11}x - \frac{38}{11}$$

$$\bigcirc \ 11y = -2x + 39$$

$$\bigcirc 2y = 11x - 39$$

Question 13 2 pts

Find the limit  $\lim_{x o 0^+}\left(rac{1}{x}-rac{1}{e^x-1}
ight)$ 

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Quiz saved at 8:23pm

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