

PreCalculus Honors  
Exponential/Log Test  
CALCULATOR ALLOWED

Name \_\_\_\_\_

Directions: Round at 3 decimal places.

Score \_\_\_\_\_.

1. If  $h$  is the function defined by  $h(x) = \ln(e^x + x^e)$ , what is the slope of the line tangent to  $h$  at  $x = 2$ ?

- (A) 0.072
  - (B) 0.666
  - (C) 1.000
  - (D) 1.029
  - (E) 1.169
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2. Let  $f$  be the function given by  $f(x) = 3\ln(2x)$  and let  $g$  be a function given by  $g(x) = x^3 + 2x$ . At what value of  $x$  do the graphs of  $f$  and  $g$  have parallel tangent lines?

- (a) -0.781
  - (b) -0.301
  - (c) 0.521
  - (d) 0.782
  - (e) 1.000
- 

3. If  $f(x) = \frac{x}{\ln(3x)}$ , then what is the interval of decreasing?

- (a)  $(1, 3)$
  - (b)  $(1, 3e)$
  - (c)  $\left(0, \frac{1}{3}\right)$
  - (d)  $\left(0, \frac{1}{3}e\right)$
  - (e)  $\left(1, \frac{1}{3}e\right)$
- 

4.  $\lim_{x \rightarrow 1} \frac{\ln x^2}{x^2 - 1}$  is

- (a) -1
- (b) 0
- (c) 1
- (d)  $e$
- (e) undefined

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5. The equation of the line **normal** to  $y = 2x\sqrt{x^2 + 8} + 2$  at  $(0, 2)$  is

- (a)  $x - 4\sqrt{2}y = -8\sqrt{2}$
  - (b)  $x + 4\sqrt{2}y = 8\sqrt{2}$
  - (c)  $4\sqrt{2}x + y = 2$
  - (d)  $4\sqrt{2}x - y = -2$
  - (e)  $x + 4\sqrt{2}y = 2$
- 

6. If  $e^{x+y} = y$ , then  $\frac{dy}{dx} =$

- (a)  $\frac{e^{x+y}}{1 - e^{x+y}}$
  - (b)  $\frac{e^{x+y}}{1 + e^{x+y}}$
  - (c)  $\frac{e^{x+y}}{e^{x+y} - 1}$
  - (d)  $e^{x+y}$
  - (e)  $2e^{x+y}$
- 

7. Let  $f(x) = \frac{e^x}{x}$  on  $x \in (0, \infty)$ . The minimum value attained by  $f(x)$  is

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

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Formulas:  $S = P \left( 1 + \frac{r}{n} \right)^{nt}$        $S = \frac{P \left( \left( 1 + \frac{r}{n} \right)^n - 1 \right)}{\frac{r}{n}}$        $A = \frac{P \left( 1 - \left( 1 + \frac{r}{n} \right)^{-nt} \right)}{\frac{r}{n}}$

1. Suppose you take a \$345,000 loan at 10.5% fixed APR compounded monthly for 30 years.

a) What are the monthly payments?

b) How much will you actually pay the bank?

2. Find the domain, VAs, and extreme values, algebraically, of  $y = \ln(15 + 3x - 5x^2 - x^3)$ .

Domain: \_\_\_\_\_

Zeros: \_\_\_\_\_

y-intercept: \_\_\_\_\_

Extreme points: \_\_\_\_\_

3. Find the domain and extreme values, algebraically, of  $y = x^3 e^{-2x}$ .

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Domain: \_\_\_\_\_

Extreme points: \_\_\_\_\_

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NO CALCULATOR

Name \_\_\_\_\_

Score \_\_\_\_\_.

Show all work.

4.  $\frac{d}{dx} \left[ \ln \sqrt[7]{e^{5x^4}} \right]$

5.  $D_x \left[ (4x-3)^5 (5x^2+3)^6 \right]$

6. Find all the traits and sketch  $y = x^3 e^{-2x}$

Domain:

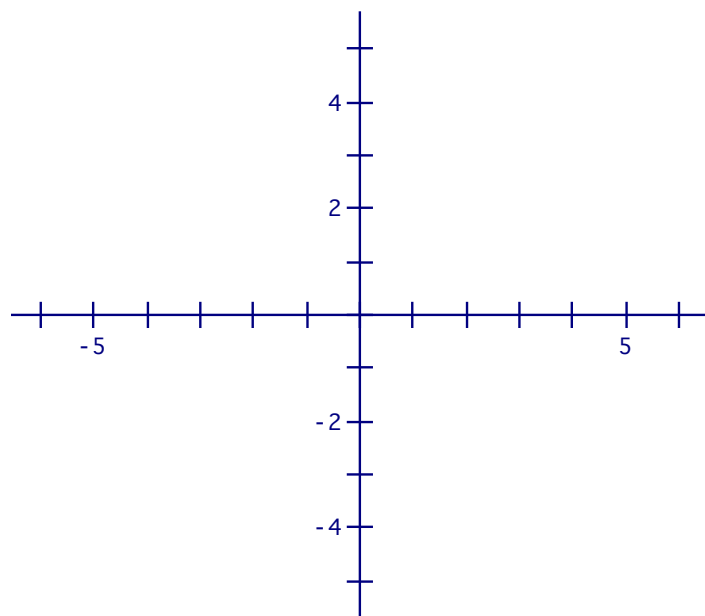
Range:

Zeros:

$y$ -Intercepts:

End Behavior:

Extreme Points:



7. Find all the traits and sketch  $y = \ln(15 + 3x - 5x^2 - x^3)$

Domain:

Range:

$x$ -Intercepts:

$y$ -Intercepts:

End Behavior:

VAs:

Extremes Points:

