# Differentiation Test 6A



Name

Answers









7 8 9 10 11 12

Question: 1

If 
$$f(x) = \log_e(\sin(2x))$$
 then  $f'(\frac{\pi}{6})$  is equal to

a) 
$$-\frac{2\sqrt{3}}{3}$$
 b)  $\frac{2\sqrt{3}}{3}$  c)  $2\sqrt{3}$ 

b) 
$$\frac{2\sqrt{3}}{3}$$

c) 
$$2\sqrt{3}$$

d) 
$$-2\sqrt{3}$$
 e)  $\sqrt{3}$ 

e) 
$$\sqrt{2}$$

Question: 2

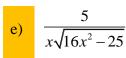
If 
$$y = \cos^{-1}\left(\frac{5}{4x}\right)$$
 and  $x > 0$  then  $\frac{dy}{dx}$  is equal to

a) 
$$\frac{-20}{\sqrt{25-16x^2}}$$

b) 
$$\frac{-12}{\sqrt{16x^2 - 25}}$$

c) 
$$\frac{-4}{\sqrt{25-16x^2}}$$

d) 
$$\frac{\sqrt{25-16x^2}}{-12}$$



#### **Question: 3**

The volume of a sphere is decreasing at a rate of 3 cm<sup>3</sup>/min. When the radius is 3 cm, the rate of change of the radius of the sphere, in cm/min is equal to:

a) 
$$-108\pi$$

c) 
$$-\frac{1}{12\pi}$$
 d)  $\frac{1}{12\pi}$  e)  $-12\pi$ 

d) 
$$\frac{1}{12\pi}$$

## Question: 4

If 
$$y = \tan^{-1}\left(\frac{x}{3}\right)$$
 then  $\frac{d^2y}{dx^2}$  is equal to

a) 
$$\frac{-54x}{(9x^2+1)^2}$$

b) 
$$\frac{-27}{(9x^2+1)^2}$$

a) 
$$\frac{-54x}{(9x^2+1)^2}$$
 b)  $\frac{-27}{(9x^2+1)^2}$  c)  $\frac{-18x}{(9x^2+1)^2}$  d)  $\frac{-6x}{(x^2+9)^2}$  e)  $\frac{3x}{(x^2+9)^2}$ 

$$\frac{-6x}{\left(x^2+9\right)}$$

e) 
$$\frac{3x}{\left(x^2+9\right)^2}$$

#### **Question: 5**

If  $b \in \mathbb{R}^+$ , then gradient of the normal to the curve:  $3\sin(y) = bx$  at the origin is equal to:

a) 
$$-\frac{3}{b}$$

b) 
$$-\frac{b}{3}$$
 c)  $\frac{3}{b}$  d)  $\frac{b}{3}$ 

c) 
$$\frac{3}{b}$$

d) 
$$\frac{b}{3}$$

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#### **Question: 6**

If  $x = \frac{1}{2t}$  and  $y = \sqrt{t}$  then  $\frac{dy}{dx}$  is equal to:

a) 
$$-\frac{1}{\sqrt{t^3}}$$

b) 
$$\frac{1}{\sqrt{t^3}}$$

a) 
$$-\frac{1}{\sqrt{t^3}}$$
 b)  $\frac{1}{\sqrt{t^3}}$  c)  $-\frac{1}{4\sqrt{t^3}}$  d)  $-\sqrt{t^3}$  e)  $-4\sqrt{t^3}$ 

d) 
$$-\sqrt{i}$$

e) 
$$-4\sqrt{t^3}$$

## **Question: 7**

The gradient of the tangent to the curve  $x^3 + 9xy + y^3 + 11 = 0$  at the point (-1,2) is equal to

b) 7 c) 
$$-\frac{1}{7}$$
 d)  $\frac{1}{7}$  e)  $-1$ 

d) 
$$\frac{1}{7}$$

## **Question: 8**

If f(x) = x(x-4)(x-2)(c-x) is convex over the interval [0, 1] then:

a) 
$$c = 0$$

b) 
$$c=2$$

c) 
$$c = 0, 2, 4$$

$$c = 0$$
 b)  $c = 2$  c)  $c = 0, 2, 4$  d)  $c < -\frac{4}{3}$  e)  $c = \frac{5}{4}$ 

$$c = \frac{5}{4}$$

## **Question: 9**

The graph of  $y = x^2 e^{-2x}$ 

- has a local minimum at  $(1,e^{-2})$  and an asymptote at x=0.
- has a local maximum at (0,0) and an asymptote at y=0.
- has a asymptotes at x = 0 and y = 0.
- has a local maximum at  $(1,e^{-2})$ , a local minimum at (0,0) and no asymptotes
- has inflection points at  $x = \frac{2 \pm \sqrt{2}}{2}$  and an asymptote at y = 0

## **Question: 10**

If  $y = \sin(t)$  and  $x = \cos(t)$  then  $\frac{d^2y}{dx^2}$  is equal to:

a) 
$$tan(t)$$

b) 
$$-\tan(t)$$

c) 
$$\sin(t)\cos(t)$$

d) 
$$-\sec^2(t)\sin(t)$$

e) 
$$\frac{-1}{\sin^3(t)}$$