Look over your study guide, we will go over questions quickly after the bell rings.

(11) $x^2+3y^2=1+3xy$

$2x+6yy'=0+3(xy'+y\cdot 1)$

$2x+6yy'=3xy'+3y$

$6yy'-3xy'=3y-2x$

$\frac{y'(6y-3x)}{6y-3x}=\frac{3y-2x}{6y-3x}$

$\frac{dy}{dx}=y'=\frac{3y-2x}{6y-3x}$

(b) $1^2+3y^2=1+3\cdot 1\cdot y$ (1, 0) (1, 1)

$1+3y^2=1+3y$

$3y^2-3y=0$

$3y(y-1)=0$

$y=0,1$

(1,0)

$\frac{dy}{dx}=\frac{3\cdot 0-2\cdot 1}{6\cdot 0-3\cdot 1}=\frac{2}{3}$

$y-0=\frac{2}{3}(x-1)$

$y=\frac{2}{3}x-\frac{2}{3}$

(1,1)

$\frac{dy}{dx}=\frac{1}{3}$

$y-1=\frac{1}{3}(x-1)$

$y=\frac{1}{3}x+\frac{2}{3}$

**AP CALCULUS AB**
**Unit 4 Review**
**Derivatives**

***No calculator may be used to solve the following problems.***

1. If $x^3 + 2x^2y - 4y = 7$, then when $x = 1$, $\frac{dy}{dx} =$

(A) $-\frac{9}{2}$ (B) $0$ (C) $-8$ (D) $-3$ (E) $\frac{7}{2}$

2. If $f(x) = x\sqrt{4x-1}$, then $f'(x)$ is

(A) $\frac{6x-1}{\sqrt{4x-1}}$ (B) $\frac{2x}{\sqrt{4x-1}}$ (C) $\frac{1}{\sqrt{4x-1}}$ (D) $\frac{-6x+2}{\sqrt{4x-1}}$ (E) $\frac{9x-2}{2\sqrt{4x-1}}$

3. $\frac{d}{dx}\cos^2(x^3) =$

(A) $6x^2\sin(x^3)\cos(x^3)$

(B) $6x^2\cos(x^3)$

(C) $\sin^2(x^3)$

(D) $-6x^2\sin(x^3)\cos(x^3)$

(E) $-2\sin(x^3)\cos(x^3)$

4. An equation of the line tangent to the graph of $y=\cos(2x)$ at $x=\frac{\pi}{4}$ is

(A) $y-1=-\left(x-\frac{\pi}{4}\right)$

(B) $y-1=-2\left(x-\frac{\pi}{4}\right)$

(C) $y=2\left(x-\frac{\pi}{4}\right)$

(D) $y=-\left(x-\frac{\pi}{4}\right)$

(E) $y=-2\left(x-\frac{\pi}{4}\right)$

5. If $f(x)=\cos e^{2x}$, then $f'(x)=$

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

6. If $f(x)=\tan(3x)$, then $f'\left(\frac{\pi}{9}\right)=$

(A) $\frac{4}{3}$ (B) $4$ (C) $6$ (D) $12$ (E) $6\sqrt{3}$

7. If $x^2 = 25 - y^2$, what is the value of $\frac{d^2y}{dx^2}$ at the point $(3, 4)$?

(A) $-\frac{25}{64}$ (B) $-\frac{7}{64}$ (C) $\frac{7}{64}$ (D) $\frac{25}{64}$ (E) $\frac{4}{3}$

***A graphing calculator may be used to solve the following problems.***

8. Let $f$ be a differentiable function such that $f(5) = 3$ and $f'(5) = 2$. If the tangent line to the graph of $f$ at $x = 5$ is used to find an approximation to a zero of $f$, that approximation is

(A) 6.5 (B) 4.3 (C) 3.5 (D) 0.5 (E) 0.3

9. Let $f$ be the function given by $f(x) = 5e^{3x^3}$. For what positive value of $a$ is the slope of the line tangent to the graph of $f$ at $(a, f(a))$ equal to 6?

(A) 0.142 (B) 0.344 (C) 0.393 (D) 0.595 (E) 0.714

10. Let $f(x)=\sqrt{2x}$. If the rate of change of $f$ at $x=c$ is four times its rate of change at $x=1$, then $c=$

(A) $\frac{1}{16}$ (B) $\frac{1}{2\sqrt{2}}$ (C) $\frac{1}{\sqrt{2}}$ (D) 1 (E) 32

***FREE RESPONSE. No calculator - show all of your work.***

11. Consider the curve given by $x^2+3y^2=1+3xy$.

(a) Show that $\frac{dy}{dx}=\frac{3y-2x}{6y-3x}$

(b) Find all points on the curve whose $x$-coordinate is 1, and write an equation for the tangent line at each of these points.

# Homework

## Unit 4 Review

Oct 21-8:47 AM