Questions on 3.7 HW?

(31) $y = 4 + \cot x - 2\csc x$

a) $P\left(\pi/2, 2\right)$

$y' = -\csc^2 x - 2\left(-\csc x \cot x\right)$

$y' = -\csc^2 x + 2\csc x \cot x$

$y'\left(\frac{\pi}{2}\right) = -\csc^2\left(\pi/2\right) + 2\csc\left(\frac{\pi}{2}\right)\cot\left(\frac{\pi}{2}\right)$

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

$$\boxed{y = -x + \frac{\pi}{2} + 2}$$

b) $0 = -\csc^2 x + 2\csc x \cot x$

$0 = -\dfrac{1}{\sin^2 x} + \dfrac{2\cos x}{(\sin x)(\sin x)} = -\dfrac{1}{\sin^2 x} + \dfrac{2\cos x}{\sin^2 x}$

$0 = \dfrac{1}{\sin^2 x}\left(2\cos x - 1\right)$

$2\cos x - 1 = 0$

$\dfrac{2\cos x}{2} = \dfrac{1}{2}$

$\cos x = \frac{1}{2}$

$\boxed{x = \dfrac{\pi}{3}}$ at point Q

$y\left(\frac{\pi}{3}\right) = 4 + \cot\left(\frac{\pi}{3}\right) - 2\csc\left(\frac{\pi}{3}\right)$

$y\left(\frac{\pi}{3}\right) = 4 + \frac{1}{\sqrt{3}} - 2\left(\frac{2}{\sqrt{3}}\right)$

$y\left(\frac{\pi}{3}\right) = 4 - \frac{3}{\sqrt{3}}$

$y\left(\frac{\pi}{3}\right) = 4 - \sqrt{3}$

$Q\left(\frac{\pi}{3}, 4 - \sqrt{3}\right)$

$y - (4 - \sqrt{3}) = 0\left(x - \frac{\pi}{3}\right)$

horiz.
tan
line $\boxed{y = 4 - \sqrt{3}}$

Oct 6-7:43 AM

AP CALCULUS AB
Unit 3A Review
Derivatives

No calculator may be used to solve the following problems.
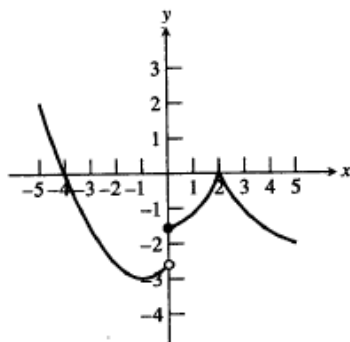
1. If $g(x) = \dfrac{1}{32}x^4 - 5x^2$, find $g'(4)$.

(A) -72   (B) -32   (C) -24   (D) 24   (E) 32

2. . A particle moves along the x-axis so that at any time $t \geq 0$ its position is given by $x(t) = t^3 - 3t^2 - 9t + 1$. For what values of t is the particle at rest?

(A) No values   (B) 1 only   (C) 3 only   (D) 5 only   (E) 1 and 3

3. The graph of the function f shown in the figure has a horizontal tangent at the point $(-1, -3)$ and a cusp at $(2, 0)$. For what values of x, $-5 < x < 5$, is f not differentiable?

(Ā) 0 only   (B) 0 and 2 only   (C) −1 and 0 only
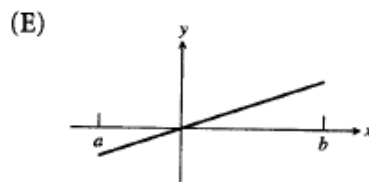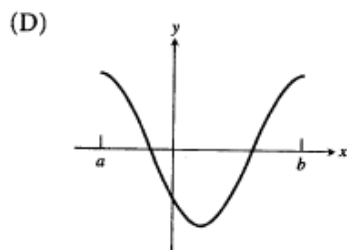
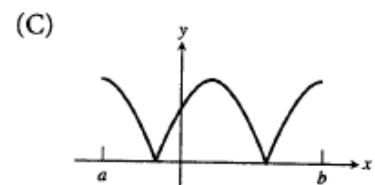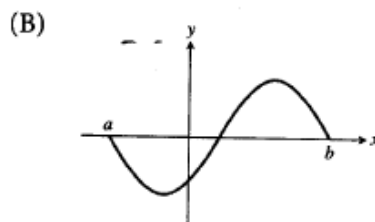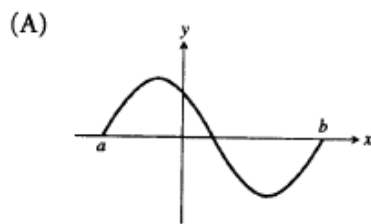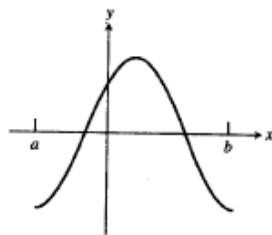(D) −1, 0, and 2   (E) −1 and 2 only

4. If $y = \dfrac{2x+3}{3x+2}$, then $\dfrac{dy}{dx} =$

(A) $\dfrac{12x+13}{(3x+2)^2}$ (B) $\dfrac{12x-13}{(3x+2)^2}$ (C) $\dfrac{5}{(3x+2)^2}$ (D) $\dfrac{-5}{(3x+2)^2}$ (E) $\dfrac{2}{3}$

5. What is the instantaneous rate of change at $t = -1$ of the function f if $f(t) = \dfrac{t^3+t}{4t+1}$?

(A) $\dfrac{12}{9}$ (B) $\dfrac{4}{9}$ (C) $-\dfrac{20}{9}$ (D) $-\dfrac{4}{9}$ (E) $-\dfrac{12}{9}$

6. The graph of f is shown in the figure below. Which of the following could be the graph of the derivative of f?

(A)

(B)

(C)

(D)

(E)

7. Let $f(x) = \lim\limits_{h \to 0} \dfrac{(x+h)^2 - x^2}{h}$. For what value of x does $f(x) = 4$?

(A) -2 (B) -1 (C) 1 (D) 2 (E) 4

A graphing calculator may be used for the following problems.

8. Let *f* be the function given by $f(x) = 3^x$. For what value of *x* is the slope of the line tangent to the curve at $(x, f(x))$ equal to 1?

(A) 1.099   (B) 0.086   (C) 0   (D) -0.086 (E) -1.099

9. An equation of the line tangent to the graph of $y = 3x - \cos x$ at $x = 0$ is
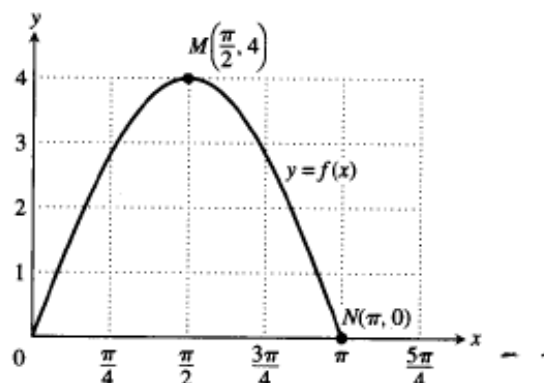
(A) $y = 2x$ (B) $y = 2x - 1$ (C) $y = 3x + 1$ (D) $y = 3x - 1$ (E) $y = 4x$

10. Which of the following is an equation of the line tangent to the graph of $f(x) = x^6 - x^4$ at the point where $f'(x) = -1$?

(A) $y = -x - 1.031$

(B) $y = -x - 0.836$

(C) $y = -x + 0.836$

(D) $y = -x + 0.934$

(E) $y = -x + 1.031$

FREE RESPONSE – *No calculator is allowed*

11. Let f be the function given by $f(x) = 4 \sin x$. As shown, the graph of f passes through the point $M(\pi/2, 4)$ and crosses the x-axis at point $N(\pi, 0)$.

(A) Write an equation for the line passing through points M and N.

(B) Write an equation for the line tangent to the graph of f at point N. Show the analysis that leads to your equation.

Homework

Unit 3A Review

Oct 21-8:47 AM