Homework 11

The **due date** for this homework is **Tue 7 May 2013 12:00 AM EDT**.

Question 1

Find the derivative of $f(x) = \sqrt{x}(2x^2 - 4x)$.

- $f'(x) = 2x^{5/2} - 4x^{3/2}$
- $f'(x) = 4\sqrt{x}(x - 1)$
- $f'(x) = \dfrac{2x - 2}{\sqrt{x}}$
- $f'(x) = 2x^{3/2} - 4x^{1/2}$
- $f'(x) = \sqrt{x}(5x^2 - 6x)$
- $f'(x) = \sqrt{x}(5x - 6)$

Question 2

Find the derivative of $f(x) = 6x^4 - \dfrac{3}{x^2} - 2\pi$.

- $f'(x) = 24x^3 + \dfrac{3}{x^2}$
- $f'(x) = 24x^3 - \dfrac{3}{2x}$
- $f'(x) = 24x^3 - \dfrac{3}{x^2}$
- $f'(x) = 24x^3 - \dfrac{6}{x^3}$
- $f'(x) = 24x^3 + \dfrac{6}{x^3}$
- $f'(x) = 24x^3 - \dfrac{6}{x^2}$

Question 3

Find the derivative of $f(x) = 7(x^3 + 4x)^5 \cos x$.

- ○ $f'(x) = 7(x^3 + 4x)^4 \left[5 \cos x - (x^3 + 4x) \sin x \right]$
- ○ $f'(x) = 45(x^3 + 4x)^4 (3x^2 + 4) \cos x$
- ○ $f'(x) = -45(x^3 + 4x)^4 (3x^2 + 4) \sin x$
- ○ $f'(x) = 7(x^3 + 4x)^4 \left[5(3x^2 + 4) \cos x - (x^3 + 4x) \sin x \right]$
- ○ $f'(x) = 7(x^3 + 4x)^4 \left[5(3x^2 + 4) \cos x + (x^3 + 4x) \sin x \right]$
- ○ $f'(x) = 7(x^3 + 4x)^4 \left[5 \cos x + (x^3 + 4x) \sin x \right]$

Question 4

Find the derivative of $f(x) = (e^x + \ln x) \sin x$.

- ○ $f'(x) = \dfrac{e^x \sin x}{x}$
- ○ $f'(x) = \dfrac{\sin x}{x} + e^x \sin x$
- ○ $f'(x) = \left(\dfrac{1}{x} + e^x \right) \cos x$
- ○ $f'(x) = e^x (\sin x + \cos x)$
- ○ $f'(x) = (\sin x)(\ln x) + e^x \cos x$
- ○ $f'(x) = \dfrac{\sin x}{x} + (\ln x)(\cos x) + e^x \sin x + e^x \cos x$

Question 5

Find the derivative of $f(x) = \dfrac{\sqrt{x+3}}{x^2}$.

$\circ \quad f'(x) = \dfrac{1}{4x\sqrt{x+3}}$

$\circ \quad f'(x) = \dfrac{5x+12}{2x^3\sqrt{x+3}}$

$\circ \quad f'(x) = -\dfrac{3x+12}{2x\sqrt{x+3}}$

$\circ \quad f'(x) = \dfrac{(x-4)\sqrt{x+3}}{2x^3}$

$\circ \quad f'(x) = -\dfrac{3x+12}{2x^3\sqrt{x+3}}$

$\circ \quad f'(x) = \dfrac{5x+12}{2x\sqrt{x+3}}$

Question 6

Find the derivative of $f(x) = \dfrac{\ln x}{\cos x}$.

$\circ \quad f'(x) = \dfrac{\cos x - \ln x \sin x}{x\cos^2 x}$

$\circ \quad f'(x) = \dfrac{\cos x + \ln x \sin x}{x\cos x}$

$\circ \quad f'(x) = \dfrac{(1+\ln x)\sin x}{x\cos^2 x}$

$\circ \quad f'(x) = \dfrac{\cos x + x\ln x \sin x}{x\cos^2 x}$

$\circ \quad f'(x) = \dfrac{\ln x \sin x}{x\cos^2 x}$

$\circ \quad f'(x) = \dfrac{\cos x - \ln x \sin x}{x\sin^2 x}$

Question 7

Find the derivative of $f(x) = \dfrac{\sqrt[3]{x} - 4}{x^3}$.

○ $f'(x) = \dfrac{10\sqrt[3]{x} - 36}{3x^4}$

○ $f'(x) = \dfrac{12 - 2\sqrt[3]{x}}{x^4}$

○ $f'(x) = \dfrac{10\sqrt[3]{x} - 36}{x^4}$

○ $f'(x) = \dfrac{12 - 2\sqrt[3]{x}}{3x^4}$

○ $f'(x) = \dfrac{36 - 8\sqrt[3]{x}}{x^4}$

○ $f'(x) = \dfrac{36 - 8\sqrt[3]{x}}{3x^4}$

Question 8

Find the derivative of $f(x) = \sin^3(x^3)$.

○ $f'(x) = 9x^2 \sin^2(x^3) \cos(x^3)$

○ $f'(x) = 3 \sin^2(x^3) \cos(x^3)$

○ $f'(x) = 9x^2 \sin^2(x^2) \cos(3x^2)$

○ $f'(x) = 9x^2 \sin^3(x^3) \cos^2(x^3)$

○ $f'(x) = 3 \sin^2(x^3)$

○ $f'(x) = 3 \sin^2(3x^2)$

Question 9

Find the derivative of $f(x) = 4\ln(\sin 4x)$.

○ $f'(x) = 16 \tan 4x$

- $f'(x) = \dfrac{16}{\sin 4x}$
- $f'(x) = 4\tan 4x$
- $f'(x) = 16\cot 4x$
- $f'(x) = \dfrac{4}{\sin 4x}$
- $f'(x) = 4\cot 4x$

Question 10

Find the derivative of $f(x) = e^{-1/x^2}$.

- $f'(x) = -\dfrac{2}{x^3}\, e^{-1/x^2}$
- $f'(x) = e^{-2/x^3}$
- $f'(x) = \dfrac{1}{x^2}\, e^{-1/x^2}$
- $f'(x) = e^{2/x^3}$
- $f'(x) = -\dfrac{1}{x^2}\, e^{-1/x^2}$
- $f'(x) = \dfrac{2}{x^3}\, e^{-1/x^2}$

Question 11

Suppose that a certain quantity A is a function of another quantity B, which, in turn, depends on a third quantity C. We know that $B(C) = \sqrt{C}$. If the rate of change of A with respect to B is B^2, what is the rate of change of A with respect to C?

- B
- $\dfrac{1}{2\sqrt{C}}$

○ $B^2 \sqrt{C}$

○ $\dfrac{C}{2}$

○ $\dfrac{1}{2C}$

○ $\dfrac{\sqrt{C}}{2}$

Question 12

Use the information about functions f and g from the following table to compute the value of $\dfrac{d}{dx}\Big|_{x=1} g(f(x))$.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	1	1	0	3
0	0	2	0	0
1	2	3	2	0
2	3	-1	-1	2
3	-1	0	3	-1

○ 2

○ 0

○ 6

○ 4

○ -3

○ -2

☐ In accordance with the Honor Code, I certify that my answers here are my own work.

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