King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences

CODE 001 **Math 101** CODE 001

Exam 2

061

Tuesday 28/11/2006

Net Time Allowed: 90 minutes

Name: ______________________________

ID: ____________________ Sec: ____________________.

Check that this exam has 15 questions.

Important Instructions:

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2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT use the erasers attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
6. The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1. The x-intercept of the tangent line to the curve $y = x\sqrt{x^2 - 8}$ at $x = -3$ is given by

(a) $x = -27$

(b) $x = 27$

(c) $x = -\dfrac{27}{10}$

(d) $x = 10$

(e) $x = \dfrac{27}{10}$

2. The values of x for which the function $f(x) = x + 2\sin x$ has tangent lines parallel to the line $2x + 2y = 5$ are

(a) $(2k + 1)\pi$, k is an integer

(b) $2k\pi$, k is an integer

(c) $k\pi$, k is an integer

(d) $(k + 1)\pi$, k is an integer

(e) none of the above

3. If $y = \arctan(\arcsin\sqrt{x})$, then $\dfrac{dy}{dx} =$

(a) $\dfrac{1}{\sqrt{1-x^2}[1+\arcsin x]}$

(b) $\dfrac{1}{\sqrt{1-x^2}[1+(\arcsin\sqrt{x})^2]}$

(c) $\dfrac{1}{1+(\arcsin\sqrt{x})^2}$

(d) $\dfrac{1}{2\sqrt{x}\sqrt{1-x}[1+(\arcsin\sqrt{x})^2]}$

(e) $\dfrac{1}{\sqrt{1-x}[1+(\arcsin\sqrt{x})^2]}$

4. If $f(4) = \dfrac{1}{4}$, $f'(4) = -\dfrac{1}{4}$ and $g(x) = \dfrac{1+xf(x)}{\sqrt{x}}$, then $g'(4) =$

(a) $-\dfrac{1}{2}$

(b) $\dfrac{5}{8}$

(c) $-\dfrac{5}{8}$

(d) -1

(e) 0

5. Suppose that L is a function such that $L'(x) = \frac{1}{x}$ for $x > 0$.
Then the derivative of $F(x) = L(x^4) + L\left(\frac{1}{x}\right)$ is equal to

(a) $x^4 - x$

(b) $\frac{5}{x}$

(c) x^3

(d) $\frac{3}{x}$

(e) $\frac{4}{x^3}$

6. If $u = \sqrt[3]{t^2} + 2\sqrt{t^3}$, then $\frac{du}{dt}$ is equal to

(a) $\dfrac{2 + 4\sqrt[4]{t^5}}{5\sqrt[5]{t^5}}$

(b) $\dfrac{2 + 9\sqrt[6]{t^5}}{3\sqrt[3]{t}}$

(c) $\dfrac{6 + 4\sqrt[4]{t^4}}{6\sqrt[6]{t}}$

(d) $\dfrac{9 + 4\sqrt{t^4}}{5\sqrt[5]{t}}$

(e) $\dfrac{2 + 3\sqrt{t}}{6\sqrt{t^3}}$

7. If $y = \dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}$, then y' is equal to

(a) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\sec x + \dfrac{4\sec x}{\sin x} - \dfrac{8x}{x^2+1}\right]$

(b) $\dfrac{\sin^2 x \sec^8 x}{\cos^4 x(x^2+1)^2}\left[\cot x + \dfrac{5\sec x}{\sin x} - \dfrac{6x}{x^2+1}\right]$

(c) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\cot x + \dfrac{4\sec^2 x}{\tan x} - \dfrac{4x}{x^2+1}\right]$

(d) $\dfrac{\sin^6 x}{\cos^4 x(x^2+1)^2}\left[2\cot x + \dfrac{6\cos x}{\cot x} - \dfrac{4x}{x^2+1}\right]$

(e) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[\cot x + \dfrac{8\sec x}{\tan x} - \dfrac{3x}{x^2+1}\right]$

8. $\displaystyle\lim_{x\to\pi/4} \frac{\sin x - \cos x}{\cos(2x)}$ is equal to

(a) 1

(b) -1

(c) $\sqrt{2}$

(d) $-\dfrac{\sqrt{2}}{2}$

(e) 0

9. If $g(x) = \sqrt{5 - 2x}$, then $g'''(2)$ is equal to

(a) 2

(b) -1

(c) $-\frac{1}{2}$

(d) -3

(e) 1

10. $\tanh(\ln x) =$

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

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

(c) $\frac{x^2 - 1}{x^2 + 1}$

(d) ∞

(e) $\frac{x^2 + 1}{x^2 - 1}$

11. If $(x-y)^2 = x+y$, then

(a) $\dfrac{dy}{dx} = \dfrac{2x-2y+1}{2x-2y-1}$

(b) $\dfrac{dy}{dx} = \dfrac{2x-2y-1}{2x+2y+1}$

(c) $\dfrac{dy}{dx} = \dfrac{2x-2y-1}{2x-2y+1}$

(d) $\dfrac{dy}{dx} = 2x-2y-1$

(e) $\dfrac{dy}{dx} = \dfrac{2x-2y+1}{2x+2y+1}$

12. An equation of the normal line to the graph of $y = x^{x\cos x}$ when $x = \dfrac{\pi}{2}$ is given by

(a) $2\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y-1) = 2x - \pi$

(b) $\pi\ln\sqrt{\pi}(y-1) = (\ln 2)x - \pi$

(c) $(\ln\sqrt{\pi} - \ln\sqrt{2})(y-1) = 2x - \pi$

(d) $\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y-\pi) = x - 1$

(e) $2\pi\ln(\pi-2)(y-1) = x - \pi$

13. Which one of the following statements is true about the function $f(x) = x|x|$?

(a) f is not differentiable at $x = 0$

(b) $f'(-x) = -f'(x)$

(c) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2x$

(d) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2|x|$

(e) f is differentiable on $(-\infty, \infty)$ and $f'(x) = -2x$

14. There are two lines through the point $(2, -3)$ that are tangent to the parabola $y = x^2 + x$. Then the **sum** of the slopes of these lines is

(a) 11

(b) 13.5

(c) 7.5

(d) 10

(e) 9

15. If $\sqrt{x} + \sqrt{y} = 4$ defines implicitly a relation between x and y, then y'' is equal to

(a) $\dfrac{\sqrt{xy}}{2x^2 y}(x + y)$

(b) $\dfrac{xy + y\sqrt{xy}}{2x^2 y}$

(c) $-\sqrt{\dfrac{y}{x}}$

(d) $-\sqrt{\dfrac{x}{y}}$

(e) $\dfrac{x\sqrt{y} + y\sqrt{x}}{2x^2}$

King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences

CODE 002 **Math 101** **CODE 002**

Exam 2

061

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Name: ______________________________

ID: ____________________ Sec: ____________________.

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1. The x-intercept of the tangent line to the curve $y = x\sqrt{x^2 - 8}$ at $x = -3$ is given by

(a) $x = \frac{27}{10}$

(b) $x = 27$

(c) $x = -\frac{27}{10}$

(d) $x = -27$

(e) $x = 10$

2. If $f(4) = \frac{1}{4}$, $f'(4) = -\frac{1}{4}$ and $g(x) = \frac{1 + xf(x)}{\sqrt{x}}$, then $g'(4) =$

(a) -1

(b) $-\frac{5}{8}$

(c) $\frac{5}{8}$

(d) 0

(e) $-\frac{1}{2}$

3. If $u = \sqrt[3]{t^2} + 2\sqrt{t^3}$, then $\dfrac{du}{dt}$ is equal to

(a) $\dfrac{6 + 4\sqrt[4]{t^4}}{6\sqrt[6]{t}}$

(b) $\dfrac{2 + 3\sqrt{t}}{6\sqrt{t^3}}$

(c) $\dfrac{9 + 4\sqrt{t^4}}{5\sqrt[5]{t}}$

(d) $\dfrac{2 + 9\sqrt[6]{t^5}}{3\sqrt[3]{t}}$

(e) $\dfrac{2 + 4\sqrt[4]{t^5}}{5\sqrt[5]{t^5}}$

4. If $g(x) = \sqrt{5 - 2x}$, then $g'''(2)$ is equal to

(a) $-\dfrac{1}{2}$

(b) 2

(c) -3

(d) 1

(e) -1

5. If $y = \arctan(\arcsin\sqrt{x})$, then $\dfrac{dy}{dx} =$

(a) $\dfrac{1}{1 + (\arcsin\sqrt{x})^2}$

(b) $\dfrac{1}{\sqrt{1 - x^2}[1 + \arcsin x]}$

(c) $\dfrac{1}{\sqrt{1 - x^2}[1 + (\arcsin\sqrt{x})^2]}$

(d) $\dfrac{1}{2\sqrt{x}\sqrt{1 - x}[1 + (\arcsin\sqrt{x})^2]}$

(e) $\dfrac{1}{\sqrt{1 - x}[1 + (\arcsin\sqrt{x})^2]}$

6. $\displaystyle\lim_{x \to \pi/4} \frac{\sin x - \cos x}{\cos(2x)}$ is equal to

(a) 0

(b) $\sqrt{2}$

(c) -1

(d) 1

(e) $-\dfrac{\sqrt{2}}{2}$

7. $\tanh(\ln x) =$

(a) $\dfrac{x^2+1}{x^2-1}$

(b) $\dfrac{x^2-1}{x^2+1}$

(c) $\dfrac{1-x^2}{x^2+1}$

(d) $\dfrac{x^2+1}{1-x^2}$

(e) ∞

8. Suppose that L is a function such that $L'(x) = \dfrac{1}{x}$ for $x > 0$.
Then the derivative of $F(x) = L(x^4) + L\left(\dfrac{1}{x}\right)$ is equal to

(a) $\dfrac{4}{x^3}$

(b) $x^4 - x$

(c) $\dfrac{5}{x}$

(d) $\dfrac{3}{x}$

(e) x^3

9. If $y = \dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}$, then y' is equal to

(a) $\dfrac{\sin^6 x}{\cos^4 x (x^2+1)^2}\left[2\cot x + \dfrac{6\cos x}{\cot x} - \dfrac{4x}{x^2+1}\right]$

(b) $\dfrac{\sin^2 x \sec^8 x}{\cos^4 x (x^2+1)^2}\left[\cot x + \dfrac{5\sec x}{\sin x} - \dfrac{6x}{x^2+1}\right]$

(c) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[\cot x + \dfrac{8\sec x}{\tan x} - \dfrac{3x}{x^2+1}\right]$

(d) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\sec x + \dfrac{4\sec x}{\sin x} - \dfrac{8x}{x^2+1}\right]$

(e) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\cot x + \dfrac{4\sec^2 x}{\tan x} - \dfrac{4x}{x^2+1}\right]$

10. The values of x for which the function $f(x) = x + 2\sin x$ has tangent lines parallel to the line $2x + 2y = 5$ are

(a) $2k\pi$, k is an integer

(b) $k\pi$, k is an integer

(c) none of the above

(d) $(k+1)\pi$, k is an integer

(e) $(2k+1)\pi$, k is an integer

11. An equation of the normal line to the graph of $y = x^{x\cos x}$ when $x = \dfrac{\pi}{2}$ is given by

(a) $(\ln\sqrt{\pi} - \ln\sqrt{2})(y-1) = 2x - \pi$

(b) $\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y-\pi) = x - 1$

(c) $2\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y-1) = 2x - \pi$

(d) $2\pi\ln(\pi - 2)(y-1) = x - \pi$

(e) $\pi\ln\sqrt{\pi}(y-1) = (\ln 2)x - \pi$

12. If $\sqrt{x} + \sqrt{y} = 4$ defines implicitly a relation between x and y, then y'' is equal to

(a) $\dfrac{x\sqrt{y} + y\sqrt{x}}{2x^2}$

(b) $\dfrac{xy + y\sqrt{xy}}{2x^2y}$

(c) $-\sqrt{\dfrac{x}{y}}$

(d) $-\sqrt{\dfrac{y}{x}}$

(e) $\dfrac{\sqrt{xy}}{2x^2y}(x+y)$

13. There are two lines through the point $(2, -3)$ that are tangent to the parabola $y = x^2 + x$. Then the **sum** of the slopes of these lines is

(a) 10

(b) 13.5

(c) 9

(d) 11

(e) 7.5

14. If $(x - y)^2 = x + y$, then

(a) $\dfrac{dy}{dx} = \dfrac{2x - 2y - 1}{2x - 2y + 1}$

(b) $\dfrac{dy}{dx} = \dfrac{2x - 2y + 1}{2x - 2y - 1}$

(c) $\dfrac{dy}{dx} = \dfrac{2x - 2y - 1}{2x + 2y + 1}$

(d) $\dfrac{dy}{dx} = \dfrac{2x - 2y + 1}{2x + 2y + 1}$

(e) $\dfrac{dy}{dx} = 2x - 2y - 1$

15. Which one of the following statements is true about the function $f(x) = x|x|$?

(a) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2|x|$

(b) f is not differentiable at $x = 0$

(c) f is differentiable on $(-\infty, \infty)$ and $f'(x) = -2x$

(d) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2x$

(e) $f'(-x) = -f'(x)$

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Department of Mathematical Sciences

CODE 003 **Math 101** CODE 003

Exam 2

061

Tuesday 28/11/2006

Net Time Allowed: 90 minutes

Name: ____

ID: ______________________ Sec: ______________________.

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1. If $f(4) = \frac{1}{4}$, $f'(4) = -\frac{1}{4}$ and $g(x) = \frac{1 + xf(x)}{\sqrt{x}}$, then $g'(4) =$

(a) $-\frac{5}{8}$

(b) 0

(c) $-\frac{1}{2}$

(d) $\frac{5}{8}$

(e) -1

2. If $y = \frac{\sin^2 x \tan^4 x}{(x^2+1)^2}$, then y' is equal to

(a) $\frac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[\cot x + \frac{8\sec x}{\tan x} - \frac{3x}{x^2+1}\right]$

(b) $\frac{\sin^6 x}{\cos^4 x(x^2+1)^2}\left[2\cot x + \frac{6\cos x}{\cot x} - \frac{4x}{x^2+1}\right]$

(c) $\frac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\sec x + \frac{4\sec x}{\sin x} - \frac{8x}{x^2+1}\right]$

(d) $\frac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\cot x + \frac{4\sec^2 x}{\tan x} - \frac{4x}{x^2+1}\right]$

(e) $\frac{\sin^2 x \sec^8 x}{\cos^4 x(x^2+1)^2}\left[\cot x + \frac{5\sec x}{\sin x} - \frac{6x}{x^2+1}\right]$

3. The values of x for which the function $f(x) = x + 2\sin x$ has tangent lines parallel to the line $2x + 2y = 5$ are

(a) $(2k+1)\pi$, k is an integer

(b) none of the above

(c) $k\pi$, k is an integer

(d) $(k+1)\pi$, k is an integer

(e) $2k\pi$, k is an integer

4. $\displaystyle\lim_{x\to\pi/4} \frac{\sin x - \cos x}{\cos(2x)}$ is equal to

(a) $-\dfrac{\sqrt{2}}{2}$

(b) 0

(c) $\sqrt{2}$

(d) 1

(e) -1

5. $\tanh(\ln x) =$

(a) $\dfrac{x^2+1}{1-x^2}$

(b) $\dfrac{x^2+1}{x^2-1}$

(c) $\dfrac{x^2-1}{x^2+1}$

(d) $\dfrac{1-x^2}{x^2+1}$

(e) ∞

6. If $u = \sqrt[3]{t^2} + 2\sqrt{t^3}$, then $\dfrac{du}{dt}$ is equal to

(a) $\dfrac{2+3\sqrt{t}}{6\sqrt{t^3}}$

(b) $\dfrac{2+9\sqrt[6]{t^5}}{3\sqrt[3]{t}}$

(c) $\dfrac{9+4\sqrt{t^4}}{5\sqrt[5]{t}}$

(d) $\dfrac{6+4\sqrt[4]{t^4}}{6\sqrt[6]{t}}$

(e) $\dfrac{2+4\sqrt[4]{t^5}}{5\sqrt[5]{t^5}}$

7. The x-intercept of the tangent line to the curve $y = x\sqrt{x^2 - 8}$ at $x = -3$ is given by

(a) $x = -27$

(b) $x = 10$

(c) $x = -\dfrac{27}{10}$

(d) $x = \dfrac{27}{10}$

(e) $x = 27$

8. Suppose that L is a function such that $L'(x) = \dfrac{1}{x}$ for $x > 0$. Then the derivative of $F(x) = L(x^4) + L\left(\dfrac{1}{x}\right)$ is equal to

(a) $x^4 - x$

(b) x^3

(c) $\dfrac{5}{x}$

(d) $\dfrac{4}{x^3}$

(e) $\dfrac{3}{x}$

9. If $y = \arctan(\arcsin\sqrt{x})$, then $\dfrac{dy}{dx} =$

(a) $\dfrac{1}{2\sqrt{x}\sqrt{1-x}[1+(\arcsin\sqrt{x})^2]}$

(b) $\dfrac{1}{\sqrt{1-x}[1+(\arcsin\sqrt{x})^2]}$

(c) $\dfrac{1}{\sqrt{1-x^2}[1+(\arcsin\sqrt{x})^2]}$

(d) $\dfrac{1}{\sqrt{1-x^2}[1+\arcsin x]}$

(e) $\dfrac{1}{1+(\arcsin\sqrt{x})^2}$

10. If $g(x) = \sqrt{5-2x}$, then $g'''(2)$ is equal to

(a) $-\dfrac{1}{2}$

(b) 2

(c) -1

(d) 1

(e) -3

11. An equation of the normal line to the graph of $y = x^{x\cos x}$ when $x = \dfrac{\pi}{2}$ is given by

(a) $\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y - \pi) = x - 1$

(b) $2\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y - 1) = 2x - \pi$

(c) $2\pi\ln(\pi - 2)(y - 1) = x - \pi$

(d) $(\ln\sqrt{\pi} - \ln\sqrt{2})(y - 1) = 2x - \pi$

(e) $\pi\ln\sqrt{\pi}(y - 1) = (\ln 2)x - \pi$

12. There are two lines through the point $(2, -3)$ that are tangent to the parabola $y = x^2 + x$. Then the **sum** of the slopes of these lines is

(a) 9

(b) 13.5

(c) 10

(d) 7.5

(e) 11

13. Which one of the following statements is true about the function $f(x) = x|x|$?

(a) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2x$

(b) f is differentiable on $(-\infty, \infty)$ and $f'(x) = -2x$

(c) f is not differentiable at $x = 0$

(d) $f'(-x) = -f'(x)$

(e) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2|x|$

14. If $\sqrt{x} + \sqrt{y} = 4$ defines implicitly a relation between x and y, then y'' is equal to

(a) $-\sqrt{\dfrac{y}{x}}$

(b) $-\sqrt{\dfrac{x}{y}}$

(c) $\dfrac{\sqrt{xy}}{2x^2y}(x+y)$

(d) $\dfrac{x\sqrt{y} + y\sqrt{x}}{2x^2}$

(e) $\dfrac{xy + y\sqrt{xy}}{2x^2y}$

15. If $(x-y)^2 = x+y$, then

(a) $\dfrac{dy}{dx} = \dfrac{2x-2y+1}{2x+2y+1}$

(b) $\dfrac{dy}{dx} = \dfrac{2x-2y-1}{2x+2y+1}$

(c) $\dfrac{dy}{dx} = \dfrac{2x-2y-1}{2x-2y+1}$

(d) $\dfrac{dy}{dx} = \dfrac{2x-2y+1}{2x-2y-1}$

(e) $\dfrac{dy}{dx} = 2x-2y-1$

King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences

CODE 004 **Math 101** **CODE** 004

Exam 2

061

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1. The x-intercept of the tangent line to the curve $y = x\sqrt{x^2 - 8}$ at $x = -3$ is given by

(a) $x = -\dfrac{27}{10}$

(b) $x = 27$

(c) $x = -27$

(d) $x = \dfrac{27}{10}$

(e) $x = 10$

2. Suppose that L is a function such that $L'(x) = \dfrac{1}{x}$ for $x > 0$.
Then the derivative of $F(x) = L(x^4) + L\left(\dfrac{1}{x}\right)$ is equal to

(a) $x^4 - x$

(b) $\dfrac{3}{x}$

(c) $\dfrac{4}{x^3}$

(d) x^3

(e) $\dfrac{5}{x}$

3. If $f(4) = \frac{1}{4}$, $f'(4) = -\frac{1}{4}$ and $g(x) = \frac{1 + xf(x)}{\sqrt{x}}$, then $g'(4) =$

(a) $\frac{5}{8}$

(b) $-\frac{1}{2}$

(c) 0

(d) $-\frac{5}{8}$

(e) -1

4. $\tanh(\ln x) =$

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

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

(c) ∞

(d) $\frac{x^2-1}{x^2+1}$

(e) $\frac{1-x^2}{x^2+1}$

5. If $u = \sqrt[3]{t^2} + 2\sqrt{t^3}$, then $\dfrac{du}{dt}$ is equal to

(a) $\dfrac{2 + 9\sqrt[6]{t^5}}{3\sqrt[3]{t}}$

(b) $\dfrac{9 + 4\sqrt{t^4}}{5\sqrt[5]{t}}$

(c) $\dfrac{6 + 4\sqrt[4]{t^4}}{6\sqrt[6]{t}}$

(d) $\dfrac{2 + 3\sqrt{t}}{6\sqrt{t^3}}$

(e) $\dfrac{2 + 4\sqrt[4]{t^5}}{5\sqrt[5]{t^5}}$

6. If $y = \dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}$, then y' is equal to

(a) $\dfrac{\sin^2 x \sec^8 x}{\cos^4 x (x^2+1)^2}\left[\cot x + \dfrac{5\sec x}{\sin x} - \dfrac{6x}{x^2+1}\right]$

(b) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\sec x + \dfrac{4\sec x}{\sin x} - \dfrac{8x}{x^2+1}\right]$

(c) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[\cot x + \dfrac{8\sec x}{\tan x} - \dfrac{3x}{x^2+1}\right]$

(d) $\dfrac{\sin^6 x}{\cos^4 x (x^2+1)^2}\left[2\cot x + \dfrac{6\cos x}{\cot x} - \dfrac{4x}{x^2+1}\right]$

(e) $\dfrac{\sin^2 x \tan^4 x}{(x^2+1)^2}\left[2\cot x + \dfrac{4\sec^2 x}{\tan x} - \dfrac{4x}{x^2+1}\right]$

7. If $y = \arctan(\arcsin\sqrt{x})$, then $\dfrac{dy}{dx} =$

(a) $\dfrac{1}{\sqrt{1-x^2}[1+(\arcsin\sqrt{x})^2]}$

(b) $\dfrac{1}{2\sqrt{x}\sqrt{1-x}[1+(\arcsin\sqrt{x})^2]}$

(c) $\dfrac{1}{1+(\arcsin\sqrt{x})^2}$

(d) $\dfrac{1}{\sqrt{1-x}[1+(\arcsin\sqrt{x})^2]}$

(e) $\dfrac{1}{\sqrt{1-x^2}[1+\arcsin x]}$

8. If $g(x) = \sqrt{5-2x}$, then $g'''(2)$ is equal to

(a) 2

(b) 1

(c) $-\dfrac{1}{2}$

(d) -1

(e) -3

9. The values of x for which the function $f(x) = x + 2\sin x$ has tangent lines parallel to the line $2x + 2y = 5$ are

(a) $(k+1)\pi, \quad k$ is an integer

(b) $2k\pi, \quad k$ is an integer

(c) $k\pi, \quad k$ is an integer

(d) none of the above

(e) $(2k+1)\pi, \quad k$ is an integer

10. $\displaystyle\lim_{x\to\pi/4} \frac{\sin x - \cos x}{\cos(2x)}$ is equal to

(a) $-\dfrac{\sqrt{2}}{2}$

(b) $\sqrt{2}$

(c) -1

(d) 1

(e) 0

11. There are two lines through the point $(2, -3)$ that are tangent to the parabola $y = x^2 + x$. Then the **sum** of the slopes of these lines is

(a) 9

(b) 13.5

(c) 10

(d) 11

(e) 7.5

12. If $\sqrt{x} + \sqrt{y} = 4$ defines implicitly a relation between x and y, then y'' is equal to

(a) $\dfrac{\sqrt{xy}}{2x^2y}(x+y)$

(b) $-\sqrt{\dfrac{y}{x}}$

(c) $-\sqrt{\dfrac{x}{y}}$

(d) $\dfrac{x\sqrt{y} + y\sqrt{x}}{2x^2}$

(e) $\dfrac{xy + y\sqrt{xy}}{2x^2y}$

13. An equation of the normal line to the graph of $y = x^{x\cos x}$ when $x = \dfrac{\pi}{2}$ is given by

(a) $2\pi \ln(\pi - 2)(y - 1) = x - \pi$

(b) $(\ln\sqrt{\pi} - \ln\sqrt{2})(y - 1) = 2x - \pi$

(c) $2\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y - 1) = 2x - \pi$

(d) $\pi(\ln\sqrt{\pi} - \ln\sqrt{2})(y - \pi) = x - 1$

(e) $\pi \ln\sqrt{\pi}(y - 1) = (\ln 2)x - \pi$

14. Which one of the following statements is true about the function $f(x) = x|x|$?

(a) $f'(-x) = -f'(x)$

(b) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2x$

(c) f is differentiable on $(-\infty, \infty)$ and $f'(x) = 2|x|$

(d) f is not differentiable at $x = 0$

(e) f is differentiable on $(-\infty, \infty)$ and $f'(x) = -2x$

15. If $(x-y)^2 = x+y$, then

(a) $\dfrac{dy}{dx} = \dfrac{2x-2y+1}{2x-2y-1}$

(b) $\dfrac{dy}{dx} = \dfrac{2x-2y-1}{2x-2y+1}$

(c) $\dfrac{dy}{dx} = \dfrac{2x-2y-1}{2x+2y+1}$

(d) $\dfrac{dy}{dx} = \dfrac{2x-2y+1}{2x+2y+1}$

(e) $\dfrac{dy}{dx} = 2x-2y-1$

Q	MM	V1	V2	V3	V4
1	a	c	c	c	a
2	a	a	e	d	b
3	a	d	d	a	b
4	a	a	c	a	d
5	a	d	d	c	a
6	a	b	e	b	e
7	a	c	b	c	b
8	a	d	d	e	e
9	a	d	e	a	e
10	a	c	e	e	a
11	a	c	c	b	c
12	a	a	b	c	e
13	a	d	a	e	c
14	a	d	a	e	c
15	a	b	a	c	b