WeBWorK assignment number 3 is due : 03/04/2011 at 10:00pm MST.

The primary purpose of WeBWorK is to let you know that you are getting the correct answer or to alert you if you are making some kind of mistake. Usually you can attempt a problem as many times as you want before the due date. However, if you are having trouble figuring out your error, you should consult the book, or ask a fellow student, one of the TA's or your professor for help. Don't spend a lot of time guessing – it's not very efficient or effective.

Give 4 or 5 significant digits for (floating point) numerical answers. For most problems when entering numerical answers, you can if you wish enter elementary expressions such as $2\wedge3$ instead of 8, $sin(3*pi/2)$instead of -1, $e\wedge(ln(2))$ instead of 2, $(2+tan(3))*(4-sin(5))\wedge6-7/8$ instead of 27620.3413, etc. Here's the **list of the functions** which WeBWorK understands.

You can use the Feedback button on each problem page to send e-mail to the professors.

---

1. **(1 pt) Chap2/1_1.pg**

USE THE DEFINITION OF DERIVATIVES.

Find the slope of the tangent line to the curve $y = f(x) = 3x^2$ at the point $(4,48)$.

__________.

---

2. **(1 pt) Chap2/1_2.pg**

USE THE DEFINITION OF DERIVATIVES.

Find the slope of the tangent line to the curve $y = f(x) = -x^2+2x+2$ at the point $(2,2)$.

__________.

---

3. **(1 pt) Chap2/1_3.pg**

USE THE DEFINITION OF DERIVATIVES.

Find the equation of the tangent line to the curve $y = 1/x$ at $(3,1/3)$.

$y =$ _____ $x+$ _____

---

4. **(1 pt) Chap2/1_4.pg**

USE THE DEFINITION OF DERIVATIVES.

An object, initially at rest, falls due to gravity. Find its instantaneous velocity (ft/sec) at $t = 3.9$ seconds, __________ (ft/sec), and at $t = 5.4$ seconds, __________ (ft/sec).

---

5. **(1 pt) Chap2/1_5.pg**

USE THE DEFINITION OF DERIVATIVES.

How long will it take the falling object, initially at rest, falling due to gravity, to reach an instantaneous velocity of 64 feet per second?

__________ seconds.

---

6. **(1 pt) Chap2/1_6.pg**

USE THE DEFINITION OF DERIVATIVES.

A particle moves along a coordinate line and s, its directed distance in centimeters from the origin after t seconds, is given by $s = f(t) = \sqrt{4t+5}$. Find teh instantaneous velocity of the particle after 3 seconds.

__________ centimeter per second

---

7. **(1 pt) Chap2/2_1.pg**

USE THE DEFINITION OF DERIVATIVES.

Let $f(x) = 5x-4$. Find $f'(-2)$.

__________.

---

8. **(1 pt) Chap2/2_2.pg**

USE THE DEFINITION OF DERIVATIVES.

If $f(x) = 4x^3+4x$, find $f'(x)$.

__________.

---

9. **(1 pt) Chap2/2_3.pg**

DO **NOT** USE THE DEFINITION OF DERIVATIVES!!

If

$$f(x) = \frac{1}{x^{4.2}},$$

find $f'(x)$.

__________.

---

10. **(1 pt) Chap2/2_4.pg**

USE THE DEFINITION OF DERIVATIVES.

Find $F'(x)$ if $F(x) = \sqrt[4]{x}$, $x > 0$.

__________.

Hint: $(a-b)(a+b) = a^2-b^2$, $(a-b)(a^2+ab+b^2) = a^3-b^3$, and $(a-b)(a^3+a^2b+ab^2+b^3) = a^4-b^4$

---

11. **(1 pt) Chap2/2_5.pg**

USE THE DEFINITION OF DERIVATIVES.

Find $g'(c)$ if $g(x) = 2/(x+3)$.

____

---

12. **(1 pt) Chap2/2_6.pg**

USE THE DEFINITION OF DERIVATIVES.

Each of the following is a derivative, but of what function and at what point?

$$\text{(a)} \lim_{h\to0} \frac{(7+h)^2-49}{h} \qquad \text{(b)} \lim_{x\to3} \frac{\frac{2}{x^3}-\frac{2}{3^3}}{x-3}$$

(a) $f(x) =$ __________ at the point $x =$ __________.

(b) $f(x) =$ __________ at the point $x =$ __________.

---

13. **(1 pt) Chap2/2_7.pg**

Let $y = f(x) = 3-x^3$. Find $\triangle y$ when x changes from 0.4 to 1.3.

____

14. **(1 pt) Chap2/2_8.pg**

USE THE DEFINITION OF DERIVATIVES.

Let $f(x) = |x|$. Sketch a graph of the derivative $f'(x)$.

$$\lim_{h\to 0} \frac{|2+h|-|2|}{h} =$$

____

$$\lim_{h\to 0} \frac{|-2+h|-|-2|}{h} =$$

____

$$\lim_{h\to 0^+} \frac{|0+h|-|0|}{h} =$$

____

$$\lim_{h\to 0^-} \frac{|0+h|-|0|}{h} =$$

____

$$\lim_{h\to 0} \frac{|0+h|-|0|}{h} =$$

____

15. **(1 pt) Chap2/3_1.pg**

Find the derivatives of $8x^2+9x-3$, __________, and $5x^6-2x^5-9x^2+7x+15$, __________.

16. **(1 pt) Chap2/3_2.pg**

Let $g(x) = x$, $h(x) = 5x+2$, and $f(x) = g(x)\cdot h(x)$.

$D_x g(x) =$ __________

$D_x h(x) =$ __________

$D_x f(x) =$ __________

$D_x g(x)\cdot D_x h(x) =$ __________

17. **(1 pt) Chap2/3_3.pg**

Find the derivative of $(4x^2-7)\cdot(6x^4-6x)$ by use of the **PRODUCT RULE.**

____

18. **(1 pt) Chap2/3_4.pg**

$$\text{Find } \frac{d}{dx}\frac{(4x+3)}{(6x+2)}.$$

____

19. **(1 pt) Chap2/3_5.pg**

$$\text{Find } D_x y \text{ if } y = \frac{2}{x^3+1} + \frac{2}{x}.$$

____

20. **(1 pt) Chap2/3_6.pg**

Show that the power rule holds for all negative integral exponents; that is,

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

____

21. **(1 pt) Chap2/4_1.pg**

Find $D_x(7\sin x - 7\cos x)$. __________

22. **(1 pt) Chap2/4_2.pg**

Find the equation of the tangent line to the graph of $y = 3\sin x$ at the point $(5\pi, 0)$.

$y =$ _____ $x+$ _____

23. **(1 pt) Chap2/4_3.pg**

Find $D_x(x^5\cos x)$.

____

24. **(1 pt) Chap2/4_4.pg**

$$\text{Find } \frac{d}{dx}(\frac{1+\cos x}{\sin x})$$

____

25. **(1 pt) Chap2/4_5.pg**

At time t seconds, the center of a bobbing cork is $y = 5\sin t$ centimeters above (or below) water level. What is the velocity of the cork at $t = 0, \pi/2, \pi$?

__________ (cm/sec), __________ (cm/sec), and __________ (cm/sec).

Hsiang-Ping Huang **math1210spring2011-6**

WeBWorK assignment number 4 is due : 03/04/2011 at 10:00pm MST.

The primary purpose of WeBWorK is to let you know that you are getting the correct answer or to alert you if you are making some kind of mistake. Usually you can attempt a problem as many times as you want before the due date. However, if you are having trouble figuring out your error, you should consult the book, or ask a fellow student, one of the TA's or your professor for help. Don't spend a lot of time guessing – it's not very efficient or effective.

Give 4 or 5 significant digits for (floating point) numerical answers. For most problems when entering numerical answers, you can if you wish enter elementary expressions such as $2 \wedge 3$ instead of 8, $sin(3*pi/2)$instead of -1, $e \wedge (ln(2))$ instead of 2, $(2+tan(3))*(4-sin(5)) \wedge 6-7/8$ instead of 27620.3413, etc. Here's the **list of the functions** which WeBWorK understands.

You can use the Feedback button on each problem page to send e-mail to the professors.

---

1. **(1 pt) Chap2/4_6.pg**

Find $D_x x^5 \tan^3 x$, __________, for $n \geq 1$.

---

2. **(1 pt) Chap2/4_7.pg**

Find the equation of the tangent line to the graph $y = \tan^2 x$ at the point $(\pi/4, 1)$.

$y =$ __________ $x+$ __________.

---

3. **(1 pt) Chap2/4_8.pg**

Find the point x, $0 < x < 1$ on the graph of $y = \sin^2 3x$ where the tangent line is horizontal.

____

---

4. **(1 pt) Chap2/5_1.pg**

If $y = \left(4x^4 - 6x^2 + 4x\right)^{71}$, find $D_x y$.

____

---

5. **(1 pt) Chap2/5_2.pg**

If $y = 1/\left(3x^4 - 7x^2 + 2x\right)^{65}$, find dy/dx.

____

---

6. **(1 pt) Chap2/5_3.pg**

$$\text{Find } D_t\left(\frac{5t^4 + 5t^2 + 4}{5t^5 - 6t^3 + 3t} \right)^{17}.$$

____

---

7. **(1 pt) Chap2/5_4.pg**

Let $y = \cos(2x)$. Find dy/dx.

____

---

8. **(1 pt) Chap2/5_5.pg**

Find $F'(y)$ where $F(y) = y^3 \cos^3(3x)$.

____

---

9. **(1 pt) Chap2/5_6.pg**

$$\text{Find } D_x\left(\frac{x^5(1-x)^6}{(1+x)^4} \right).$$

____

---

10. **(1 pt) Chap2/5_7.pg**

$$\text{Find } \frac{d}{dx} \frac{1}{(2x-1)^5}.$$

____

---

11. **(1 pt) Chap2/5_8.pg**

Find $D_x(\ \sin\left(x^7\right) \ )$, __________, and $D_x(\ \sin^7(x) \ )$, __________.

---

12. **(1 pt) Chap2/5_9.pg**

Find $D_x \cos^2(2x)$.

____

---

13. **(1 pt) Chap2/5_10.pg**

Find $D_x \cos\left(\sin\left((2x)^3\right)\right)$.

____

---

14. **(1 pt) Chap2/5_11.pg**

Let $f(2) = 3$, $g(2) = 4$, $f'(2) = 5$, $g'(2) = 6$, $f'(3) = 7$, $g'(3) = 8$, $f'(4) = 9$, $f'(5) = 10$, $g'(5) = 11$, $f'(6) = 12$, $g'(6) = 13$, etc.

Find $(f-g)'(2)$, __________.

Find $(f \circ g)'(2)$, __________.

---

15. **(1 pt) Chap2/6_1.pg**

If $y = \cos(2x)$, find d^3y/dx^3, __________, d^4y/dx^4, __________, and $d^{12}y/dx^{12}$, __________.

---

16. **(1 pt) Chap2/6_2.pg**

An object moves along a coordinate line so that its position s satisfies $s = 6t^2 - 2t + 8$, where s is measured in centimeters and t in seconds with $t \geq 0$.

Determine the velocity of the object when $t = 1$, __________ cm/sec, and when $t = 6$, __________ cm/sec.

When is velocity 0 ? $t =$ __________ sec.

When is it positive?

17. **(1 pt) Chap2/6_3.pg**
An object moves along a horizontal coordinate line in such a way that its position at time t is specified by $s = t^3 - 15t^2 + 72t + 9$. Here s is measured in feet and t in seconds.
(a) When is the velocity 0? $t =$ _____ $<$ _____
(b) When is the velocity positive? $t <$ _____ or $t >$ _____
(c) When is the object moving to the left (that is, in the negative direction)? _____ $< t <$ _____
(d) When is the acceleration positive? $t >$ _____

18. **(1 pt) Chap2/6_4.pg**

From the top of a building 48 feet high, a ball is thrown upward with an initial velocity of 48 feet per second.
(a) When does it reaches its maximum height?
when $t =$ _____ seconds
(b) What is its maximum height? _____ feet
(c) When does it hit the ground? when $t =$ _____ seconds
(d) With what speed does it hit the ground? **negative** _____ feet per second
(e) What is its acceleration at $t = 2$? **negative** _____ feet per second per second

19. **(1 pt) Chap2/7_1.pg**

Find dy/dx if $3x^2y - 3y = x^3 - 3$.
_____

20. **(1 pt) Chap2/7_2.pg**

Find dy/dx if $x^2 + 4y^2 = x + 9$. _____
Hint: Leave y in your answer.

21. **(1 pt) Chap2/7_3.pg**

Find the equation of the tangent line to the curve $y^3 - 4xy^2 + \cos 3xy = 2$ at the point $(0, 1)$.
$y =$ _____ $x+$ _____

22. **(1 pt) Chap2/7_4.pg**

If $y = 2x^{5/3} + \sqrt[5]{x^2 + 1}$, find $D_x y$.
_____

23. **(1 pt) Chap2/8_1.pg**

A small balloon is released at a point 150 feet away from an observer, who is on level ground. If the balloon goes straight up at a rate of 4 feet per second, how fast is the distance from the observer to the balloon increasing when the balloon is 8 feet high?
_____ feet per second

24. **(1 pt) Chap2/8_2.pg**
Water is pouring into a conical tank at the rate of 8 cubic feet per minute. If the height of the tank is 10 feet and the radius of its circular opening is 5 feet, how fast is the water level rising when the water is 4 feet deep?
_____ inches per second

25. **(1 pt) Chap2/8_3.pg**

An airplane flying north at 800 miles per hour passes over a certain town at noon. A second airplane going east at 500 miles per hour is directly over the same town 15 minutes later. if the airplanes are flying at the same altitude, how fast will they be separating at 1:15 P.M.?
_____ miles per hour

WeBWorK assignment number 5-1 is due : 03/04/2011 at 10:00pm MST.

The primary purpose of WeBWorK is to let you know that you are getting the correct answer or to alert you if you are making some kind of mistake. Usually you can attempt a problem as many times as you want before the due date. However, if you are having trouble figuring out your error, you should consult the book, or ask a fellow student, one of the TA's or your professor for help. Don't spend a lot of time guessing – it's not very efficient or effective.

Give 4 or 5 significant digits for (floating point) numerical answers. For most problems when entering numerical answers, you can if you wish enter elementary expressions such as $2 \wedge 3$ instead of 8, $sin(3*pi/2)$instead of -1, $e \wedge (ln(2))$ instead of 2, $(2+tan(3))*(4-sin(5)) \wedge 6-7/8$ instead of 27620.3413, etc. Here's the **list of the functions** which WeBWorK understands.

You can use the Feedback button on each problem page to send e-mail to the professors.

---

1. **(1 pt) Chap2/8_4.pg**

A woman standing on a cliff is watching a motorboat through a telescope as the boat approaches the shoreline directly below her. If the telescope is 100 feet above the water level and if the boat is approaching at 10 feet per seconds, at what rate is the angle of the telescope changing when the boat is 100 feet from the shore?

negative __________ radian per second

---

2. **(1 pt) Chap2/8_5.pg**

As the sun sets behind a 120-foot building, the building's shadow grows. How fast is the shadow growing (in feet per second) when the sun's ray make an angle of $\pi/3$ radians?

____

---

3. **(1 pt) Chap2/8_6.pg**

Webster City monitors the height of the water in its cylindrical water tank with an automatic recording device. Water is constantly pumped into the tank at the rate of 2500 cubic feet per hour. If the radius of the tank is 20 feet and the water level fell at the rate of 4 feet per hour at 7 A.M., at what rate was water being used exactly at that time?

__________ cubic feet per hour

---

4. **(1 pt) Chap2/9_1.pg**

Find dy if

(a) $y = 5x^4 - 5x^2 + 3x$, $dy =$ __________ dx.

(a) $y = \sqrt{5x^4 - 5x^2 + 3x}$, $dy =$ __________ dx.

(a) $y = \sin(5x^4 - 5x^2 + 3x)$, $dy =$ __________ dx.

---

5. **(1 pt) Chap2/9_2.pg**

Suppose you need good approximations to $\sqrt{4.1}$ and $\sqrt{8.9}$, but your calculator has died. What might you do?

$\sqrt{4.1} \sim$ __________

$\sqrt{8.9} \sim$ __________

---

6. **(1 pt) Chap2/9_3.pg**

Use differentials to approximate the increase in the area of a soap bubble when its radius increases from 4 inches to 4.045 inches.

__________ square inches

---

7. **(1 pt) Chap2/9_4.pg**

The side of a cube is measured as 11.4 centimeters with a possible error of ± 0.05 centimeter. Give an estimate for the possible error in the value of the volume of the cube.

__________ cubic centimeters

---

8. **(1 pt) Chap2/9_5.pg**

Poiseuille's Law for blood flow says that the volume flowing through an artery is proportional to the fourth power of the radius, that is, $V = kR^4$. By how much must the radius be increased in order to increase the blood flow by 40%?

$dR/R =$ __________%

---

9. **(1 pt) Chap2/9_6.pg**

Find the linear approximation to $f(x) = 1 + \sin 6x$ at $x = \pi/2$.

$y =$ _____ $x+$ _____