Brian Petersen

This set of WeBWorK problems covers the Chain Rule, Higher Derivatives, Implicit Differentiation, Related Rates, material in sections 2.5-2.8 of Brief Calculus. WeBWorK assignment Set3 is due on 10/02/2012 at 11:59pm EDT.

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1. (1 pt) Let $f(x) = \left(x^2-7\right)^2$. For what values of x is $f''(x) = 0$? Write the answers in increasing order.

_____, _____.

Answer(s) submitted:

- `-sqrt(28/12)`
- `sqrt(28/12)`

(correct)

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2. (1 pt) Let

$$f(x) = \sqrt{2x^2+3x+7}$$

$f'(x) =$ _____

$f'(4) =$ _____

Answer(s) submitted:

- `((1/2)(2x^2+3x+7)^-.5)(4x+3)`
- `((1/2)(2(4)^2+3(4)+7)^-.5)(4(4)+3)`

(correct)

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3. (1 pt) Let $f(x) = x^{1/3}(2x+7)^{1/2}$.

$f'(x) =$_____

$f'(10) =$_____

Answer(s) submitted:

- `(((1/3))x^(-2/3)(2x+7)^(1/2))+(x^(1/3)((1/2)(2x+7)^(-1/2)2))`
- `(((1/3))(10)^(-2/3)(2(10)+7)^(1/2))+((10)^(1/3)((1/2)(2(10)+7)^(-1/2)2))`

(correct)

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4. (1 pt) Let $f(x) = \frac{x+6}{x+5}$. Then

$f'(x) =$_____ $f''(x) =$_____

Answer(s) submitted:

- `-((1)/((x+5)^2))`
- `((x^2+10x+25)^-2)(2x+10)`

(correct)

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5. (1 pt) Let $f(x) = (x+7)\left(x^2-2\right)$. For what value of x is $f''(x) = 0$?

_____

Answer(s) submitted:

- `-14/6`

(correct)

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6. (1 pt) Find the coordinates of those points on the curve given by the equation

$$x^2 - 0xy + y^2 = 16$$

at which the tangent line has slope 1. The first point must be the one with the greater x coordinate.

_____, _____

_____, _____

Answer(s) submitted:

- `(sqrt(2)/2)*4`
- `-(sqrt(2)/2)*4`
- `-(sqrt(2)/2)*4`
- `(sqrt(2)/2)*4`

(correct)

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7. (1 pt) If f is the focal length of a convex lens and an object is placed at a distance q from the lens, then its image will be at a distance p from the lens, where f, q, and p are related by the lens equation

$$\frac{1}{f} = \frac{1}{q} + \frac{1}{p}$$

Suppose the focal length of a particular lens is 20 cm. What is the rate of change of q with respect to p when $p = 17$? (Make sure you have the correct sign for the rate.)

$\frac{dq}{dp} =$ _____

Answer(s) submitted:

- `-((1/((1/20)-(1/17)))^2/(17)^2)`

(correct)

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8. (1 pt) A street light is at the top of a 10.500 ft. tall pole. A man 6.200 ft tall walks away from the pole with a speed of 3.500 feet/sec along a straight path. How fast is the tip of his shadow moving away from the pole when the man is 34.000 feet from the pole?

_____ ft/sec

Answer(s) submitted:

- `36.75/4.3`

(correct)

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9. (1 pt) Sand falls out of the end of a slurry at the rate of 50 cc/sec. The pile forms a circular cone, the ratio of whose base diameter to height is 3. When the pile is of height 60 cm., at what rate is the height of the pile increasing?

$\frac{dh}{dt} =$_____

Answer(s) submitted:

- `.001964876`

(correct)

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10. (1 pt) If the variables x and y are related by the equation

$$x^3 + y^3 = 5$$

find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ implicitly.

(a) $\frac{dy}{dx} =$_____

(b) $\frac{d^2y}{dx^2} =$_____

(For part (b), differentiate part (a) implicitly, substitute for dy/dx using part (a), and simplify using the original equation.)

Answer(s) submitted:

- `-x^2/y^2`
- `-10xy/y^6`

(correct)