

Calculus

12/7/10
Shelby Krueger

1. Evaluate the difference quotient for the given function.

$$f(x) = 4 + 3x - x^2 \quad \frac{f(3+h) - f(3)}{h}$$

2. Express the function in the form $f \circ g$.

$$F(x) = (x^2 + 1)^{10}$$

3. Use the table of values to estimate the value of the limit.

$$\lim_{x \rightarrow 1} \frac{x^6 - 1}{x^{10} - 1}$$

1.4-1.5 Questions

1. $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2}$

2. $\lim_{x \rightarrow 0} \frac{\sin 3x}{x}$

3. Locate the discontinuities of the function and illustrate by graphing.

$$y = \frac{1}{1 + \sin x}$$

FINAL PRACTICE PROBLEMS FROM 1.6 + 2.1Section 1.6

- 1.) Find the limit
$$\lim_{x \rightarrow \infty} \left(\frac{x^3 - 2x + 3}{5 - 2x^2} \right)$$

Section 2.1

- 2.) If $g(x) = 1 - x^3$, find $g'(0)$ and use it to find an equation of the tangent line to the curve $y = 1 - x^3$ at the point $(0, 1)$.

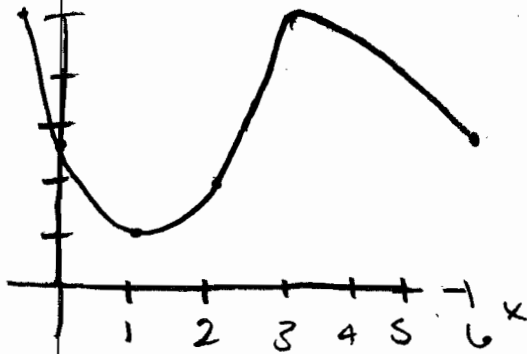
- 3.) Find $f'(a)$.

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

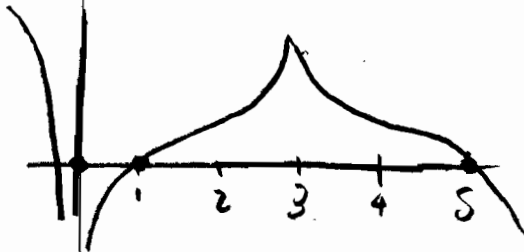
Section 2.2 Questions

#2 Use the given graph to estimate the value of each derivative.

- | | |
|------------|------------|
| A) $f'(0)$ | B) $f'(1)$ |
| C) $f'(2)$ | D) $f'(3)$ |
| E) $f'(4)$ | F) $f'(5)$ |



#28 The graph of f is given. State, with reason, the numbers at which f is not differentiable.



#21 Find the derivative of the function using the definition of derivative. State the domain of the function and the domain of its derivative.

$$g(x) = \sqrt{1+2x}$$

Section 2.3 Questions

#6 Differentiate the function

$$f(t) = \frac{1}{2}t^6 - 3t^4 + t$$

#27 Find an equation of the tangent line to the curve at the given point.

$$y = x + \sqrt{x}, \quad (1, 2)$$

#41 The equation of motion of a particle is $s = t^3 - 3t$, where s is in meters and t is in seconds. FindA) Find the velocity and acceleration as a function of t

B) Find the acceleration after 1 s

C) Graph the position, velocity, and acceleration functions on the same screen

Calc Review

2.4

The Product & Quotient Rules

#1. Differentiate

$$y = \frac{t^2}{3t^2 - 2t + 1}$$

#2. Differentiate

$$y = \frac{1 - \sec x}{\cos x}$$

#3. If $f(x) = \frac{x^2}{(1+x)}$, find $f''(1)$

① Find the derivative of $(2x+1)^5(x^3-x+1)^4$

② Find $\frac{dy}{dx}$ by implicit differentiation: $xy+2x+3x^2=4$

③ Use implicit differentiation to find an equation of the tangent line to the curve at the given point.

$$x^2 + xy + y^2 = 3 \quad (1, 1)$$

2.7

Problems 5, 13, 19

5. If $y = x^3 + 2x$ and $dx/dt = 5$ find dy/dt when $x = 2$

13. Two cars start moving from the same point. One travels south at 60 mi/h and the other travels west at 25 mi/h. At what rate is the distance between the cars increasing two hours later?

19. At noon, ship A is 100 km west of ship B. Ship A is sailing south at 35 km/hr and ship B is sailing north at 25 km/hr. How fast is the distance between the ships changing at 4:00 P.M.?

2.8 Linear Approximations and Differentials

Find the Linearization $L(x)$ of the function at a .

③ $f(x) = \cos x$, $a = \frac{\pi}{2}$

Use a linear approximation to estimate the given number.

⑫ $\sqrt{99.8}$

⑬ The edge of a cube was found to be 30 cm with a possible error in measurement of 0.1 cm. Use differentials to estimate the maximum possible error, relative error, and percentage error in computing (a) the volume of the cube and (b) the surface area of the cube.

3.1 Exponential Functions

Make a sketch of the graph of the function.

① $y = -2^{-x}$

Find the domain of each function.

⑮ (a) $f(x) = \frac{1}{1+e^x}$

(b) $f(x) = \frac{1}{1-e^x}$

⑳ Compare the rates of growth of the functions $f(x) = x^5$ and $g(x) = 5^x$ by graphing both functions in several viewing rectangles. Find all points of intersection of the graphs correct to one decimal place.

Sections 3.2-3.3

MJ Marconi

Find a formula for the inverse of the function.

$$21. f(x) = \sqrt{10 - 3x}$$

Find the exact value of each expression (without a calculator).

$$43. \begin{array}{l} a) \sin^{-1} \frac{1}{2} \\ b) \log_2 16 \end{array}$$

Differentiate each function.

$$7. f(x) = \sin x \ln(x)$$

Kerry Stanko

1.) Find the limit. Use l'Hospital's Rule where appropriate.

$$\lim_{t \rightarrow 0} \frac{e^t - 1}{t^3}$$

2.) Find the limit. Use l'Hospital's Rule where appropriate.

$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{\sin(x)}$$

3.) Find the limit. Use l'Hospital's Rule where appropriate.

$$\lim_{x \rightarrow 2} \frac{e^x - e^2}{\sin(\pi x)}$$

Joe · Section 4.3 Problem #1

- (a) find the intervals on which f is decreasing or increasing
- (b) find the local maximum and minimum values
- (c) find the intervals of concavity and inflection points

Section 4.4 Problem #1

Use the guidelines of sketching to sketch

$$y = x^3 + x$$

Section 4.4 Problem #57

Produce the graphs of f that reveal all important aspects of the curve. Estimate the intervals of increase and decrease and intervals of concavity and use calculus to find those intervals exactly.

$$f(x) = 1 + \frac{1}{x} + \frac{8}{x^2} + \frac{1}{x^3}$$

Maggie Hartz
December 5, 2010

Final Review (4.1-4.2)

- (4.1) Find the absolute maximum and the absolute minimum values of f on the given interval.
 $f(x) = x^3 - 6x^2 + 9x + 2$, $[1, 4]$

- (4.2) Verify that the function satisfies the hypotheses of the mean value theorem on the given interval. Then find all numbers c that satisfy the conclusion of the mean value theorem.
 $f(x) = e^{-2x}$

Show that the equation $x^3 - 15x + c = 0$ has at most one root in the interval $[2, 2]$

① Find $f(x)$.

$$f''(x) = 24x^2 + 2x + 10, \quad f(1) = 5, \quad f'(1) = -3$$

② Find general antiderivative.

$$g(\theta) = \cos \theta - 5 \sin \theta$$

③ The speed of a runner increased steadily during the first three seconds of a race. Her speed at half-second intervals is given in the table. Find lower and upper estimates for the distance that she traveled during these 3 seconds.

$t(s)$	0	0.5	1.0	1.5	2.0	2.5	3.0
$v(ft/s)$	0	6.2	10.8	14.9	18.1	19.4	20.2

Section 5.2

- 11) Use the Midpoint Rule with the given value of n to approximate the integral. Round the answer to four decimal places.

$$\int_2^{10} \sqrt{x^3+1} \, dx \quad n=4$$

- 19) Use the form of the definition of the integral given in Theorem 4 to evaluate the integral.

$$\int_{-1}^5 (1+3x) \, dx$$

- 31) Evaluate the integral by interpreting it in terms of areas.

$$\int_0^3 \left(\frac{1}{2}x - 1\right) \, dx$$

Review Problems

made by: Hector
Martinez

Hector Martinez
calculus one
12/6/10

Fellow Torrens in my
part try to solve these:
in 5.3/5.4

From 5.3

#14. $\int_1^9 \frac{3x-2}{\sqrt{x}} dx$

#28. $\int_0^{\pi/2} |\sin(x)| dx$

From ^{made by} 5.4 : Hector Martinez

$$\#8. F(x) = \int_x^{10} \tan \theta \, d\theta$$

$$\boxed{\text{Hint: } \int_x^{10} \tan \theta \, d\theta = - \int_{10}^x \tan \theta \, d\theta}$$