

شكراً لتحميلك هذا الملف من موقع المناهج الإماراتية



أوراق عمل مراجعة للوحدات الثانية والثالثة والرابعة

موقع المناهج ← المناهج الإماراتية ← الصف الثاني عشر المتقدم ← رياضيات ← الفصل الأول ← الملف

التواصل الاجتماعي بحسب الصف الثاني عشر المتقدم



روابط مواد الصف الثاني عشر المتقدم على تلغرام

[الرياضيات](#)

[اللغة الانجليزية](#)

[اللغة العربية](#)

[التربية الاسلامية](#)

المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة رياضيات في الفصل الأول

أسئلة الامتحان النهائي	1
أسئلة الامتحان النهائي	2
أوراق عمل درس الاتصال والسلوك الطرقي والنهايات من الوحدة الأولى	3
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**Revision Math 12 Advanced
2021-2022-Term1**



The only way to learn mathematics is to do mathematics.

Wishing you all the best 😊

SENIOR
class of 2023

Ms. Islam Ismail Abu Mesameh



12 Advanced Math
 Unit 2: Limits and Continuity

Ms. Islam Ismail

1) Estimate an arc length for a given function

Exercises (7-12)

Exercise page 68: estimate the length of the curve $y = f(x)$ on the given interval using $n = 4$ line segments.

Q8: $f(x) = \sin x, 0 \leq x \leq \pi/2$

$$\Delta x = \frac{b - a}{n} = \frac{\dots\dots\dots}{\dots\dots\dots}$$

Left	Right	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
(0,)	($\frac{\pi}{8}$,)	
Arc Length \approx		

Exercise page 68 : estimate the length of the curve $yf(x)$ on the given interval using $n = 4$ line segments **Ans: 1.906**

Q10: $f(x) = 1/x, 1 \leq x \leq 2$

$$\Delta x = \frac{b - a}{n} = \frac{\dots\dots\dots}{\dots\dots\dots}$$

Left	Right	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Arc Length \approx		

Ans: 1.1310



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Exercise page 68 : estimate the length of the curve $y=f(x)$ on the given interval
 using $n = 4$ line segments

Q12: $f(x) = x^3 + 2, -1 \leq x \leq 1$

$$\Delta x = \frac{b - a}{n} = \frac{\dots\dots\dots}{\dots\dots\dots}$$

Left	Right	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Arc Length ≈		

Ans: 3.0463

Exercise page 68 : estimate the length of the curve $y=f(x)$ on the given interval
 using $n = 4$ line segments

Q7: $f(x) = \cos x, 0 \leq x \leq \pi/2$

$$\Delta x = \frac{b - a}{n} = \frac{\dots\dots\dots}{\dots\dots\dots}$$

Left	Right	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Arc Length ≈		

Ans: 1.906



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Exercise page 68 : estimate the length of the curve $y=f(x)$ on the given interval
 using $n = 4$ line segments

Q9: $f(x) = \sqrt{x+1}$, $0 \leq x \leq 3$

$$\Delta x = \frac{b-a}{n} = \frac{\dots\dots\dots}{\dots\dots\dots}$$

Left	Right	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Arc Length ≈		

Ans:3.167

Exercise page 68 : estimate the length of the curve $y=f(x)$ on the given interval
 using $n = 4$ line segments

Q11: $f(x) = x^2 + 1$, $-2 \leq x \leq 2$

$$\Delta x = \frac{b-a}{n} = \frac{\dots\dots\dots}{\dots\dots\dots}$$

Left	Right	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Arc Length ≈		

Ans:9.153



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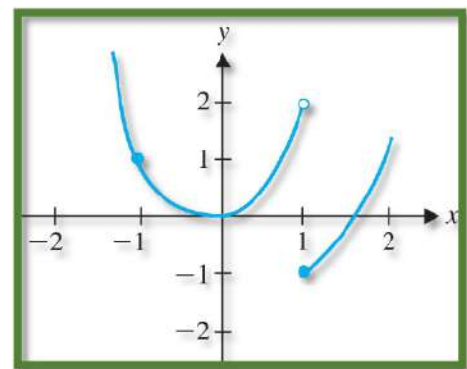
2) Find the limit of a function algebraically and graphically, if it exists

Example 3

Example 3 page 71:

Use the graph in figure 2.8 to determine

$\lim_{x \rightarrow -1} f(x)$	$\lim_{x \rightarrow 1^-} f(x)$
$\lim_{x \rightarrow 1^+} f(x)$	$\lim_{x \rightarrow 1} f(x)$



3) Find limits for polynomials, rational, and trigonometric functions using theorems

Exercises (1-20)

Exercise page 85: Evaluate each of the following limits.

Q1 $\lim_{x \rightarrow 0} (x^2 - 3x + 1)$

Q2 $\lim_{x \rightarrow 2} \sqrt[3]{2x + 1}$

Q4 $\lim_{x \rightarrow 0} \frac{x - 2}{x^2 + 1}$

Q3 $\lim_{x \rightarrow 0} \cos^{-1}(x^2)$



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Q5

$$\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{x - 3}$$

Q6

$$\lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - 3x + 2}$$

Q8

$$\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 + 2x - 3}$$

Q7

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

Q10

$$\lim_{x \rightarrow 0} \frac{\tan x}{x}$$

Q9

$$\lim_{x \rightarrow 0} \frac{\sin x}{\tan x}$$



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Q11

$$\lim_{x \rightarrow 0} \frac{xe^{-2x+1}}{x^2 + x}$$

Q12

$$\lim_{x \rightarrow 0} x^2 \csc^2 x$$

Q13

$$\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$$

Q15

$$\lim_{x \rightarrow 1} \frac{x-1}{\sqrt{x}-1}$$

Q16

$$\lim_{x \rightarrow 4} \frac{x^3 - 64}{x - 4}$$

Q14

$$\lim_{x \rightarrow 0} \frac{2x}{3 - \sqrt{x+9}}$$



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Q18

$$\lim_{x \rightarrow 0} \left(\frac{2}{x} - \frac{2}{|x|} \right)$$

Q17

$$\lim_{x \rightarrow 1} \left(\frac{1}{x-1} - \frac{2}{x^2-1} \right)$$

Q19

$$\lim_{x \rightarrow 0} \frac{1 - e^{2x}}{e^x - 1}$$

Q20

$$\lim_{x \rightarrow 0} \frac{\sin |x|}{x}$$



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4) Find limits for polynomials, rational, and trigonometric functions using theorems
Exercises (37-39)

Q37: Given that $\lim_{x \rightarrow 0^+} \frac{1 - \cos x}{x^2} = \frac{1}{2}$, quickly evaluate

$$\lim_{x \rightarrow 0^+} \frac{\sqrt{1 - \cos x}}{x}$$

Q38: Given that $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$, quickly evaluate

$$\lim_{x \rightarrow 0} \frac{1 - \cos^2 x}{x^2}$$

Q39: suppose $f(x) = \begin{cases} g(x) & \text{if } x < a \\ h(x) & \text{if } x > a \end{cases}$ for polynomials $g(x)$ and $h(x)$.

Explain why $\lim_{x \rightarrow a^-} f(x) = g(a)$ and determine $\lim_{x \rightarrow a^+} f(x)$



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6) Study the continuity of a function at a given point
 Exercises (21-28)

Exercises page 95: Determine the interval(s) on which f is continuous.

Q22 $f(x) = \sqrt{x^2 - 4}$

Q21 $f(x) = \sqrt{x + 3}$

Q23 $f(x) = \sqrt[3]{x + 2}$

Q25 $f(x) = \sin^{-1}(x + 2)$

Q26 $f(x) = \ln(\sin x)$

Q27 $f(x) = \frac{\sqrt{x+1} + e^x}{x^2 - 2}$



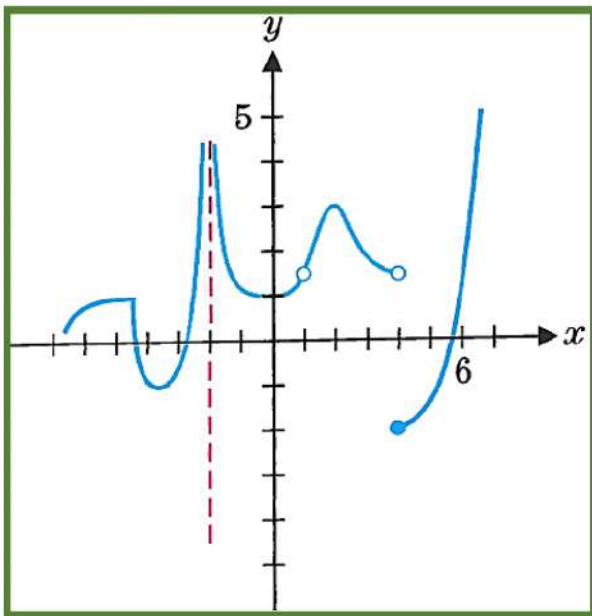
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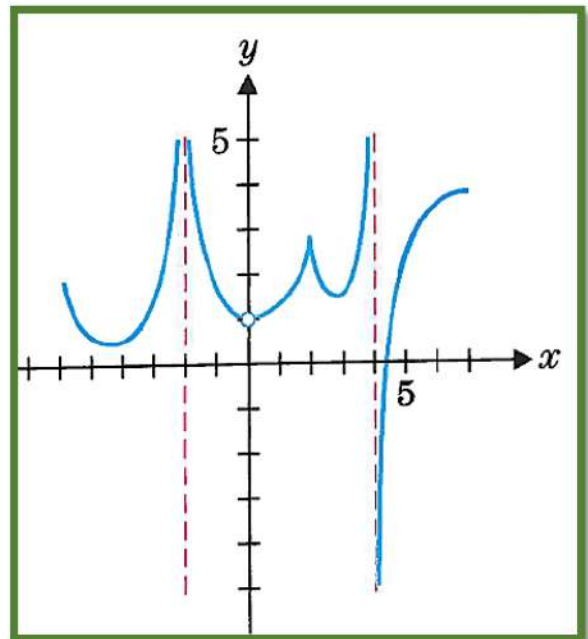
Q28 $f(x) = \frac{\ln(x^2-1)}{\sqrt{x^2-2x}}$

Q24 $f(x) = (x-1)^{3/2}$

Q37



Q38



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Determine values of a and b that make the given function continuous.

$$Q39 \quad f(x) = \begin{cases} \frac{2\sin x}{x} & \text{if } x < 0 \\ a & \text{if } x = 0 \\ b\cos x & \text{if } x > 0 \end{cases}$$

$$Q40 \quad f(x) = \begin{cases} ae^x + 1 & \text{if } x < 0 \\ \sin^{-1} \frac{x}{2} & \text{if } 0 \leq x \leq 2 \\ x^2 - x + b & \text{if } x > 2 \end{cases}$$

Q41

$$f(x) = \begin{cases} a(\tan^{-1}x + 2) & \text{if } x < 0 \\ 2e^{bx} + 1 & \text{if } 0 \leq x \leq 3 \\ \ln(x - 2) + x^2 & \text{if } x > 3 \end{cases}$$



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7) Find infinite limits and limits at infinity

Exercises (9-22)

Exercises page 106: Evaluate each of the following limits.

Q9

$$\lim_{x \rightarrow \infty} \frac{x^2 + 3x - 2}{3x^2 + 4x - 1}$$

Q10

$$\lim_{x \rightarrow \infty} \frac{2x^2 - x + 1}{4x^2 - 3x - 1}$$

Q12

$$\lim_{x \rightarrow \infty} \frac{2x^2 - 1}{4x^3 - 5x - 1}$$

Q16

$$\lim_{x \rightarrow \infty} e^{-(x+1)/(x^2+2)}$$

Q11

$$\lim_{x \rightarrow -\infty} \frac{-x}{\sqrt{4 + x^2}}$$

Q18

$$\lim_{x \rightarrow \infty} \sec^{-1} \frac{x^2 + 1}{x + 1}$$



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Q17

$$\lim_{x \rightarrow \infty} \cot^{-1} x$$

Q20

$$\lim_{x \rightarrow \infty} \sin(\tan^{-1} x)$$

Q14

$$\lim_{x \rightarrow 0^+} \ln(x \sin x)$$

Q15

$$\lim_{x \rightarrow 0^+} e^{-2/x^3}$$

Q22

$$\lim_{x \rightarrow 0^+} \tan^{-1}(\ln(x))$$

Q19

$$\lim_{x \rightarrow 0} \sin(e^{-1/x^2})$$

Q21

$$\lim_{x \rightarrow \pi/2} e^{-\tan x}$$

Q13

$$\lim_{x \rightarrow \infty} \ln\left(\frac{x^2 + 1}{x - 3}\right)$$



8) Find the average and instantaneous velocity at a given point
Exercises (19-22)

Exercise page 141: Use the position function s (in meters) to find the average velocity between

Q19) $s(t) = 16t^2 + 10$

a) $t = 0$ and $t = 2$

b) $t = 1$ and $t = 2$

c) $t = 1.9$ and $t = 2$

d) $t = 1.99$ and $t = 2$

and estimate the instantaneous velocity at $t = 2$

Q20) $s(t) = 3t^3 + 1$

a) $t = 0$ and $t = 2$

b) $t = 1$ and $t = 2$

c) $t = 1.9$ and $t = 2$

d) $t = 1.99$ and $t = 2$

and estimate the instantaneous velocity at $t = 2$

Q21) $s(t) = \sqrt{t^2 + 8t}$

a) $t = 0$ and $t = 2$

b) $t = 1$ and $t = 2$

c) $t = 1.9$ and $t = 2$

d) $t = 1.99$ and $t = 2$

and estimate the instantaneous velocity at $t = 2$

Q22) $s(t) = 3\sin(t - 2)$

a) $t = 0$ and $t = 2$

b) $t = 1$ and $t = 2$

c) $t = 1.9$ and $t = 2$

d) $t = 1.99$ and $t = 2$

and estimate the instantaneous velocity at $t = 2$

9) Write the equation of a tangent line to a graph at a given point using limits
Exercises (1-8)

The Equation of Tangent Line



Exercise page 141: Use definition to find an equation of the tangent line to $y = f(x)$ at $x = a$.

Q2) $f(x) = x^2 - 2$, $a = 0$

Q3) $f(x) = x^2 - 3x$, $a = -2$

Q1) $f(x) = x^2 - 2$, $a = 1$

Q4) $f(x) = x^2 + x$, $a = 1$

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unit 3: Differentiation

Q6) $f(x) = \frac{x}{x-1}$, $a = 0$

Q8) $f(x) = \sqrt{x+3}$, $a = 1$

Q5) $f(x) = \frac{2}{x+1}$, $a = 1$

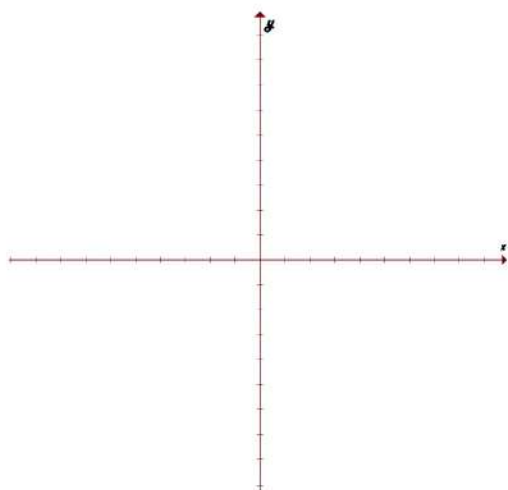
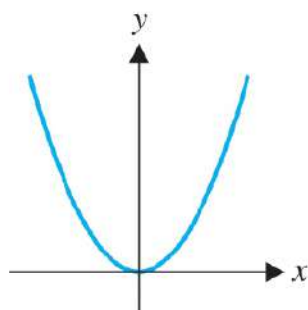
Q7) $f(x) = \sqrt{x+3}$, $a = -2$

10) Exam Duration Sketch the graph of a function using that of its derivative
Exercises (13-18)

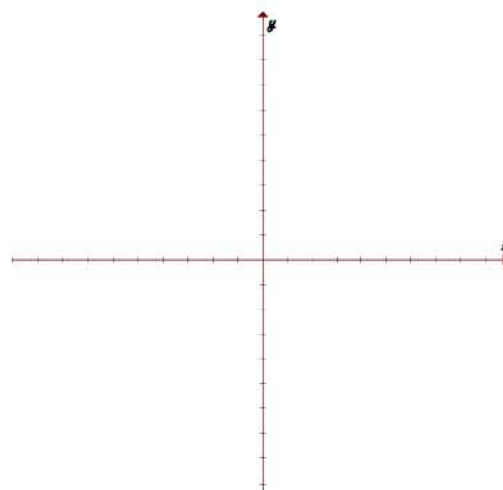
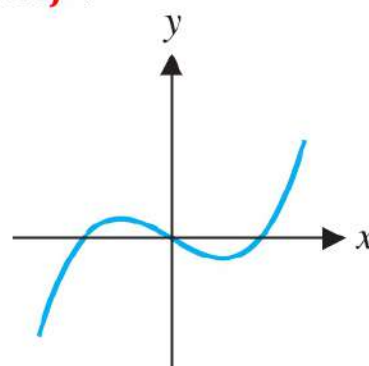
Graphs of Functions and Their Derivatives

Exercises Page 151: Use the graph of f to sketch a graph of f' .

Q13) (a)



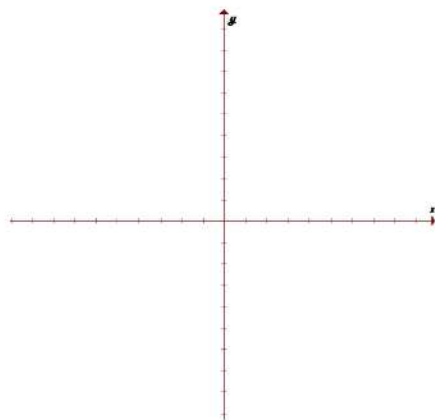
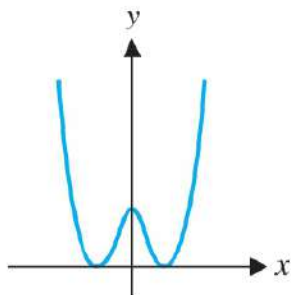
Q13) (b)



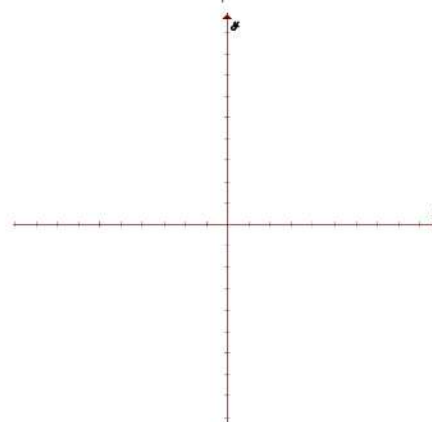
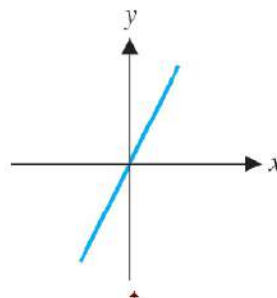
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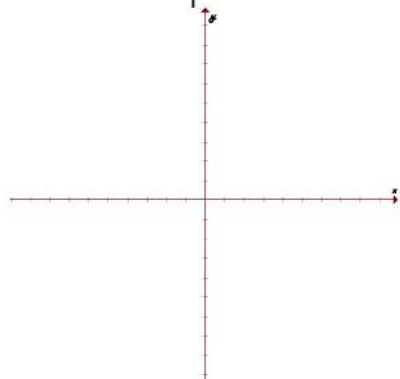
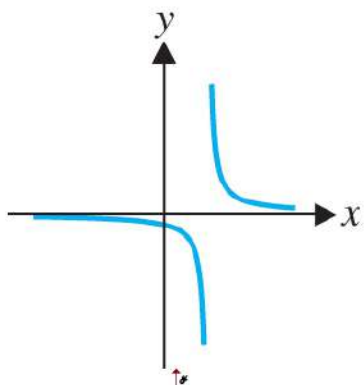
Q14) (a)



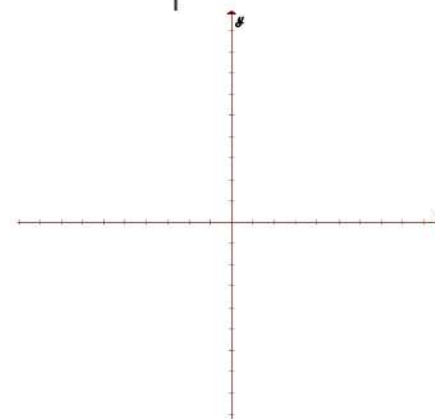
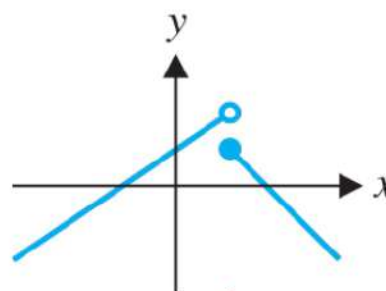
Q14) (b)



Q16) (a)



Q16) (b)



11) Find the derivative of a function using the Power Rule at a given point
Exercises (33-36)

Q33) $f(x) = x^3 - 3x + 1$

a) Determine the value(s) of x for which the tangent line to $y = f(x)$ is horizontal

b) Determine the value(s) of x for which the tangent line to $y = f(x)$ intersects the x-axis at a 45° angle.

Q34) $f(x) = x^4 - 4x + 2$

a) Determine the value(s) of x for which the tangent line to $y = f(x)$ is horizontal

b) Determine the value(s) of x for which the tangent line to $y = f(x)$ intersects the x-axis at a 45° angle.

Determine the value(s) of x for which the tangent line to $y = f(x)$ does not exist.

Q35a) $f(x) = x^{2/3}$

Q35b) $f(x) = |x - 5|$

Q35c) $f(x) = |x^2 - 3x - 4|$

Q36a) $f(x) = x^{1/3}$

Q36b) $f(x) = |x + 2|$

Q36c) $f(x) = |x^2 + 5x + 4|$

12) Find the derivative of a function using the Power Rule at a given point
Exercises (1-14)

Exercies Page 160: differentiate each function.

$$Q2) f(x) = x^9 - 3x^5 + 4x^2 - 4x$$

$$Q4) f(s) = 5\sqrt{s} - 4s^2 + 3$$

$$Q6) f(y) = \frac{2}{y^4} - y^3 + 2$$

$$Q8) h(x) = 12x - x^2 - \frac{3}{\sqrt{x^2}}$$

$$Q10) f(t) = 3t^\pi - 2t^{1.3}$$

$$Q12) f(x) = \frac{4x^2 - x + 3}{\sqrt{x}}$$

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unit 3: Differentiation

Q7) $h(x) = \frac{10}{\sqrt[3]{x}} - 2x + \pi$

Q9) $f(s) = s^{3/2} - 3x^{-1/3}$

Q11) $f(x) = \frac{3x^2 - 3x + 1}{2x}$

Q13) $f(x) = x(3x^2 - \sqrt{x})$

Q1) $f(x) = x^3 - 2x + 1$

Q3) $f(t) = 3t^3 - 2\sqrt{t}$

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unit 3: Differentiation

Q5) $f(w) = \frac{3}{w} - 8w + 1$

Q14) $f(x) = (x + 1)(3x^2 - 4)$

13) Find the derivatives of trigonometric functions using differentiation rules
Exercises (19-22)

Exercise page 184: find the derivative of each function.

Q19) (a) $f(x) = \sin x^2$

(b) $f(x) = \sin^2 x$

(c) $f(x) = \sin 2x$

Q22) (a) $f(x) = \sec x^2 \tan x^2$

(b) $f(x) = \sec^2(\tan x)$

(c) $f(x) = \sec(\tan^2 x)$

Q20) (a) $f(x) = \cos \sqrt{x}$

(b) $f(x) = \sqrt{\cos x}$

(c) $f(x) = \cos \frac{1}{2}x$

Q21) (a) $f(x) = \sin x^2 \tan x$

(b) $f(x) = \sin^2(\tan x)$

(c) $f(x) = \sin(\tan^2 x)$

14) Find the derivatives of natural logarithmic functions

Exercises (15-22)

Q15) $f(t) = \ln(t^3 + 3t)$

Q16) $f(t) = t^3 \ln t$

Q17) $f(x) = \ln \cos x$

Q18) $g(x) = \cos x \ln(x^2 + 1)$

Q19) (a) $f(x) = \sin(\ln x^2)$

Q19) (b) $g(x) = \ln(\sin x^2)$

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unit 3: Differentiation

Q20) (a) $f(x) = \frac{\sqrt{\ln x}}{x}$

Q20) (b) $f(t) = \frac{\ln \sqrt{t}}{t}$

Q21) (a) $h(x) = e^x \ln x$

Q21) (b) $h(x) = e^{\ln x}$

Q22) (a) $h(x) = 2e^x$

Q22) (b) $h(x) = \frac{e^x}{2^x}$

15) Find the derivatives of natural logarithmic functions
Exercises (39-44)

Exercise page 194: use logarithmic differentiation to find the derivative

Q39) $f(x) = x^{\sin x}$

Q40) $f(x) = x^{4-x^2}$

Q41) $f(x) = (\sin x)^x$

Q43) $f(x) = x^{\ln x}$

Q42) $f(x) = (x^2)^{4x}$

Q44) $f(x) = x^{\sqrt{x}}$

16) Use implicit differentiation to find derivatives of inverse trigonometric functions

Exercises (29-32)

Exercise page 204: find the derivative of the given function.

Q29) (a) $f(x) = \sin^{-1}(x^3 + 1)$

Q29) (b) $f(x) = \sin^{-1}(\sqrt{x})$

Q30) (a) $f(x) = \cos^{-1}(x^2 + x)$

Q30) (b) $f(x) = \cos^{-1}\left(\frac{2}{x}\right)$

Q31) (a) $f(x) = \tan^{-1}(\sqrt{x})$

Q31) (b) $f(x) = \tan^{-1}\left(\frac{1}{x}\right)$

Q32) (a) $f(x) = \sqrt{2 + \tan^{-1} x}$

Q32) (b) $f(x) = e^{\tan^{-1}(x)}$

16) Find derivatives implicitly

Exercises (65-68)

Exercise page 223 Find the derivative $y'(x)$.

Q65) $x^2 y - 3y^3 = x^2 + 1$

Q66) $\sin(xy) + x^2 = x - y$

$$\text{Q67) } \frac{y}{x+1} - 3y = \tan x$$

$$\text{Q68) } x - 2y^2 = 3e^{x/y}$$

18) Learn the Mean Value Theorem and use it in applications
Exercises (1-6)

Exercises page 219: check the hypotheses of the Mean Value Theorem and find a value of c that makes the appropriate conclusion true.

$$\text{Q1). } f(x) = x^2 + 1, [-2,2]$$

$$\text{Q2). } f(x) = x^2 + 1, [0,2]$$

Q3). $f(x) = x^3 + x^2, [0,1]$

Q4). $f(x) = x^3 + x^2, [-1,1]$

Q5). $f(x) = \sin x, \left[0, \frac{\pi}{2}\right]$

Q6). $f(x) = \sin x, [-\pi, 0]$

19) Find the linear approximation of a given function at a given point

Exercises (1-6)

Exercises page 236:

- Find the linear approximation to $f(x)$ at $x = x_0$.
- Use the linear approximation to estimate the given number.

Q1) $f(x) = \sqrt{x}, x_0 = 1, \sqrt{1.2}$

Q2) $f(x) = (x + 1)^{1/3}, x_0 = 0, \sqrt[3]{1.2}$

Q3) $f(x) = \sqrt{2x + 9}, x_0 = 0, \sqrt{8.8}$

Q4) $f(x) = \frac{2}{x}, x_0 = 1, \frac{2}{0.99}$

Q5) $f(x) = \sin 3x, x_0 = 0, \sin(0.3)$

Q6) $f(x) = \sin x, x_0 = \pi, \sin(3.0)$

20) Use l'Hopital's rule to compute limits in various cases

Exercises (1-15)

Exercises page 247: find the indicated limits.

Q1) $\lim_{x \rightarrow -2} \frac{x+2}{x^2-4}$

Q4) $\lim_{x \rightarrow -\infty} \frac{x+1}{x^2+4x+3}$

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12 Advanced Math Worksheets
Unit 4: Application of Differentiation

Q8)
$$\lim_{t \rightarrow 0} \frac{\sin t}{\sin^{-1} t}$$

Q9)
$$\lim_{x \rightarrow \pi} \frac{\sin 2x}{\sin x}$$

Q10)
$$\lim_{x \rightarrow -1} \frac{\cos^{-1} x}{x^2 - 1}$$

Q13)
$$\lim_{t \rightarrow 1} \frac{\sqrt{t} - 1}{t - 1}$$

We can apply L'Hopital's Rule many times.

Q2)
$$\lim_{x \rightarrow \infty} \frac{x^2 - 4}{x^2 - 3x + 2}$$

Q3)
$$\lim_{x \rightarrow \infty} \frac{3x^2 + 2}{x^2 - 4}$$



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Q11)

$$\lim_{x \rightarrow 0} \frac{\sin x - x}{x^3}$$

Q15)

$$\lim_{x \rightarrow \infty} \frac{x^3}{e^x}$$

Q5)

$$\lim_{t \rightarrow 0} \frac{e^{2t} - 1}{t}$$

Q6)

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



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Q7)

$$\lim_{t \rightarrow 0} \frac{\tan^{-1} t}{\sin t}$$

Q12)

$$\lim_{x \rightarrow 0} \frac{\tan x - x}{x^3}$$

Q14)

$$\lim_{t \rightarrow 1} \frac{\ln t}{t - 1}$$

