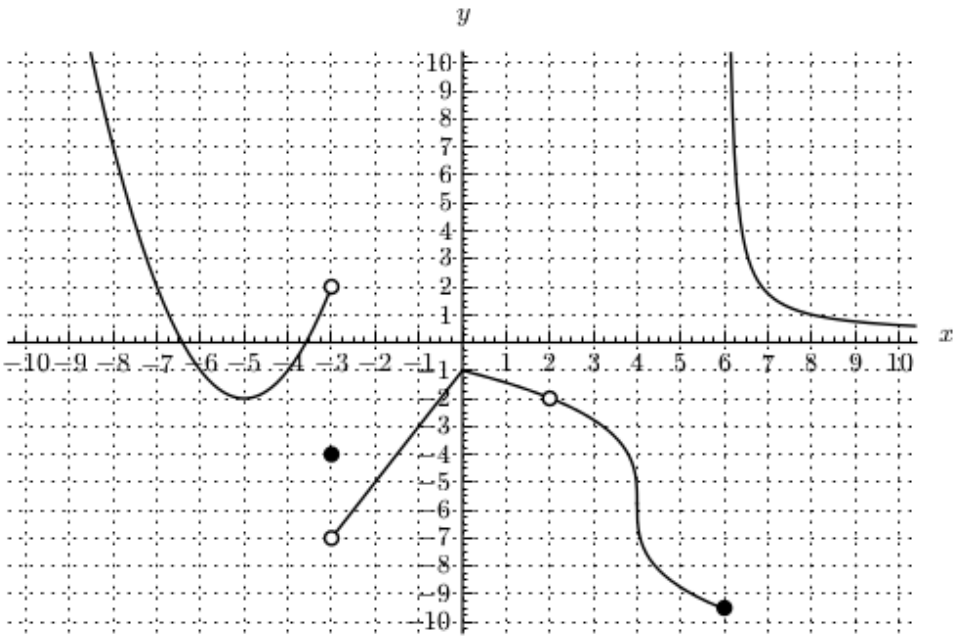
Math 1730 Test #1 Review

Chapter R

1. A student starts a business selling laptop computers on the internet. It costs him $1300 to start his business and he purchases the computers for $327 each. He sells the computers for $595 each. Find each of the following:
   a. the cost function
   b. the revenue function
   c. the profit function
   d. the break-even quantity

2. Find the equilibrium point for the pair of supply and demand functions. *q* represents the number of units produced and *x* represents the price in dollars.
   Demand: $q = 112{,}000 - 115x$ Supply: $q = 4300 + 35x$

Chapter 1



3. Given the above function find:

a. $\lim_{x\to -3^-} f(x) =$ _____ e. $\lim_{x\to 2^-} f(x) =$ _____ i. $\lim_{x\to 6^-} f(x) =$ _____ m. $\lim_{x\to 8^-} f(x) =$ _____

b. $\lim_{x\to -3^+} f(x) =$ _____ f. $\lim_{x\to 2^+} f(x) =$ _____ j. $\lim_{x\to 6^+} f(x) =$ _____ n. $\lim_{x\to 8^+} f(x) =$ _____

c. $\lim_{x\to -3} f(x) =$ _____ g. $\lim_{x\to 2} f(x) =$ _____ k. $\lim_{x\to 6} f(x) =$ _____ o. $\lim_{x\to 8} f(x) =$ _____

d. $f(-3) =$ _____ h. $f(2) =$ _____ l. $f(6) =$ _____ p. $\lim_{x\to \infty} f(x) =$ _____

4. At what x-values is the graph above discontinuous?

5. For the graph above, at what values of *x* does the derivative not exist?

6. Find each of the given limits:

a. $\lim_{x\to 2}\left(3x^3 - 7x^2 + 3\right)$ b. $\lim_{x\to 2}\dfrac{x^2-25}{x^2-9}$ c. $\lim_{x\to 1}\dfrac{x^2+3x-4}{x^2-1}$ d. $\lim_{x\to 3}\dfrac{x^2-9}{x-3}$ e. $\lim_{x\to 2}\sqrt{x^2-3x+5}$

7. Are each of the functions continuous at the given point or over the given interval?

a. $f(x)=\begin{cases} 3x-5 & \text{for} \quad x\le 2 \\ x+1 & \text{for} \quad x>2 \end{cases}$ at the point $x = 2$

b. $f(x)=\begin{cases} x^2+4x+5 & \text{for} \quad x\ne -3 \\ 2 & \text{for} \quad x=-3 \end{cases}$ at the point $x = -3$

c. $g(x)=x^2-4x+2$ over the interval (-7, 7)

8. Find a simplified form for the difference quotient and complete the table for $f(x)=x^2-5x+6$

x	h	$\dfrac{f(x+h)-f(x)}{h}$
3	2	
3	1	
3	0.1	
3	0.01	

9. Find a simplified form for the difference quotient of $f(x)=\dfrac{4}{x+1}$

10. For $f(x)=-2x^2+3x-1$, a. find $f'(x)$ by determining $\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$

b. find $f'(-2)$ and $f'(3)$

11. Calculate the derivative of each of the following functions:

a. $f(x)=x^3+4x^2-7x+5$

b. $g(x)=4x^{-2}+3x^{-1}$

c. $h(x)=\dfrac{5}{x^3}-\dfrac{4}{x^2}+\dfrac{6}{x}+\dfrac{x}{3}$

d. $y=4x^{1/2}+7x^{3/2}$

e. $f(x)=\sqrt[3]{x^2}$

f. $y=5x^{0.7}+3x^{0.2}$

g. $f(x)=(x^2-3x)(4x-7)$ (use the product rule)

h. $g(t)=\dfrac{t^3-2t}{5-t^2}$

12. Find an equation of the tangent line to the graph of $f(x)=x^3-2x^2+5x$ at the point (2, 10).

13. Find the x values for which the tangent line to the graph of $f(x)=\dfrac{1}{3}x^3-2x^2+3x-5$ is horizontal.

14. The price in dollars of a share of a stock can be estimated by $p(t)=9-0.2t+0.1t^2$ where t is the number of years after the year 2000. Find:

a. the rate of change of the share price with respect to the year, $p'(t)$.
b. The share price in 2015.
c. The rate of change of the share price in 2015.

Solutions

1. a. $C(x)=327x+1300$ b. $R(x)=595x$ c. $P(x)=268x-1300$ d. $x = 5$

2. x = \$718, q = 29,430 units

3.

a. 2	e. -2	i. -9.5	m. 1
b. -7	f. -2	j. ∞	n. 1
c. DNE	g. -2	k. DNE	o. 1
d. -4	h. undefined	l. -9.5	p. 0

4. -3, 2, 6

5. -3, 0, 2, 4, 6

6. a. -1 b. 21/5 c. 5/2 d. 6 e. $\sqrt{3}$

7. a. no b. yes c. yes

8. $2x+h-5$ Table values: 3, 2, 1.1, 1.01

9. $\dfrac{-4}{(x+h+1)(x+1)}$

10. $-4x+3$, 11, -9

11. a. $3x^2+8x-7$ b. $-8x^{-3}-3x^{-2}$ c. $-15x^{-4}+8x^{-3}-6x^{-2}+\dfrac{1}{3}$ or $-\dfrac{15}{x^4}+\dfrac{8}{x^3}-\dfrac{6}{x^2}+\dfrac{1}{3}$

d. $2x^{-1/2}+\dfrac{21}{2}x^{1/2}$ e. $\dfrac{2}{3}x^{-1/3}$ or $\dfrac{2}{3\sqrt[3]{x}}$ f. $3.5x^{-0.3}+0.6x^{-0.8}$

g. $(x^2-3x)\cdot 4+(2x-3)(4x-7)$ *or* $12x^2-38x+21$

h. $\dfrac{(5-t^2)(3t^2-2)-(t^3-2t)(-2t)}{(5-t^2)^2}$ or $\dfrac{-t^4+13t^2-10}{(5-t^2)^2}$

12. $y=9x-8$ or $y-10=9(x-2)$

13. 1, 3

14. a. $p'(t)=-0.2+0.2t$ b. \$28.50 c. \$2.80/year