MTH 126
Exam 2, Form A
Fall 2023

Formulas are on the last page, which you may pull off.

Calculators are allowed. You may use a scientific calculator or a graphing calculator (e.g., TI-84) but not one with CAS (e.g., no TI-89, no TI-Nspire CAS). You may not use a phone app.

Show work to support each answer, to be eligible for full credit. Be neat and organized. Clearly indicate your answers.

100 points possible. 10 problems at 10 points each.

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1. Suppose \$6000 is invested for 10 months at an annual simple interest rate of 10%.

(a) How much interest will be earned?

(b) What is the future value of the investment after 10 months?

2. What is the future value if \$16,384 is invested for 15 years at 12% compounded semiannually?

3. Find the future value if \$640 is invested for 14 years at 6.7%, compounded continuously.

4. Let $m = 4$, $t = 8$, and $r = 0.07$

(a) Find $s_{\overline{n}|i}$ (Don't round $s_{\overline{n}|i}$)

(b) Find v and $a_{\overline{n}|i}$ (Don't round v or $a_{\overline{n}|i}$)

(c) Find the present value of an annuity of \$4200 paid at the end of each quarter for 8 years, if the interest rate is 7% compounded quarterly. Round to 2 decimal places.

Save time on part (c) by using your result from part (a) or part (b).

Clearly indicate your answer.

5. A loan of \$13,000 is to be amortized by equal payments at the end of each year for 3 years. The interest rate is 14%, compounded annually.

▷ *The annual payment is* \$5599.51

Use this annual payment. You don't have to verify that it's correct.

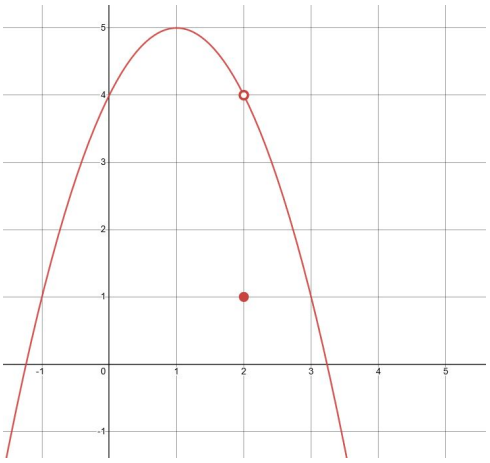
(I will only grade the rows for Period 1 and Period 2. You can leave Period 3 blank or try doing it to check your work. I won't grade Period 3.)

Construct the amortization schedule.

Period	*Payment*	*Interest Paid*	*Principal Repaid*	*Unpaid Balance*
				13,000.00
1				
2				
3				

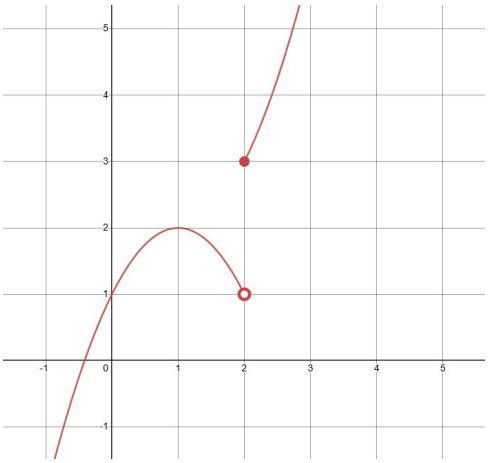
6. In each part, a graph of $y = f(x)$ is shown and a c-value is given. Use the graph to find the indicated quantities, whenever they exist. (If a limit is infinite, say "∞" or "$-\infty$" as appropriate. If a limit does not otherwise exist, say DNE.)

(a) $c = 2$



(i) $\lim_{x \to c} f(x)$ (ii) $f(c)$

(b) $c = 2$



(i) $\lim_{x \to c^-} f(x)$ (ii) $\lim_{x \to c^+} f(x)$ (iii) $\lim_{x \to c} f(x)$ (iv) $f(c)$

7. Use properties of limits and algebraic methods to find the limit, if it exists. (If a limit is infinite, say "∞" or "$-\infty$" as appropriate. If a limit does not otherwise exist, say DNE.)

$$\lim_{x \to 2} \frac{x^2 + 5x - 14}{x^2 - 7x + 10}$$

8. We are given $f(x) = 84x - 3x^2$ and $f'(x) = 84 - 6x$.

(a) Find the instantaneous rate of change of $f(x)$ at $x = 5$.

(b) Find the slope of the tangent to the graph of $f(x)$ at $x = 5$.

(c) Find the point (x, y) on the graph of $f(x)$ at $x = 5$.

9. Let $f(x) = 3x^2 + 8x$. This problem asks you to find $f'(x)$ by using the definition of derivative. The five steps are outlined for you. For parts (a) through (e), simplify the given expression.

(a) $f(x+h) =$

(b) $f(x) =$

(c) $f(x+h) - f(x) =$

(d) $\dfrac{f(x+h) - f(x)}{h} =$

(e) $f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h} =$

10. Find the derivative of the function.

(a) $f(x) = 3x^8 - 7x^5$

(b) $g(x) = 3x^{-2} + 8x^{-5}$

(c) $h(x) = x^{2/3} + x^{-3/5}$

MTH 126
Exam 2, Form B
Fall 2023

Formulas are on the last page, which you may pull off.

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Show work to support each answer, to be eligible for full credit. Be neat and organized. Clearly indicate your answers.

100 points possible. 10 problems at 10 points each.

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1. Suppose \$9000 is invested for 10 months at an annual simple interest rate of 10%.

(a) How much interest will be earned?

(b) What is the future value of the investment after 10 months?

2. What is the future value if \$13,545 is invested for 13 years at 14% compounded semiannually?

3. Find the future value if \$840 is invested for 12 years at 6.7%, compounded continuously.

4. Let $m = 4$, $t = 7$, and $r = 0.05$

(a) Find $s_{\overline{n}|i}$ (Don't round $s_{\overline{n}|i}$)

(b) Find v and $a_{\overline{n}|i}$ (Don't round v or $a_{\overline{n}|i}$)

(c) Find the present value of an annuity of \$3800 paid at the end of each quarter for 7 years, if the interest rate is 5% compounded quarterly. Round to 2 decimal places.

Save time on part (c) by using your result from part (a) or part (b).

Clearly indicate your answer.

5. A loan of \$18,000 is to be amortized by equal payments at the end of each year for 3 years. The interest rate is 16%, compounded annually.

▷ *The annual payment is* \$8014.64

Use this annual payment. You don't have to verify that it's correct.

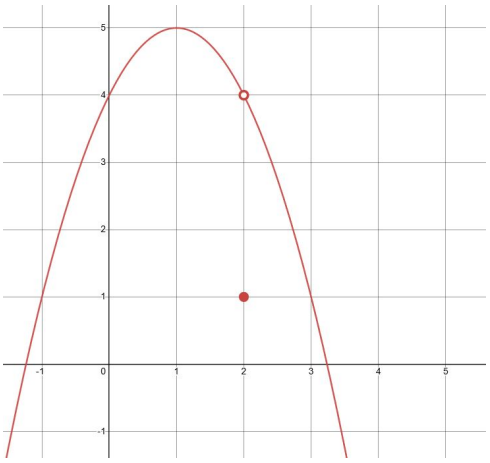
(I will only grade the rows for Period 1 and Period 2. You can leave Period 3 blank or try doing it to check your work. I won't grade Period 3.)

Construct the amortization schedule.

Period	*Payment*	*Interest Paid*	*Principal Repaid*	*Unpaid Balance*
				18,000.00
1				
2				
3				

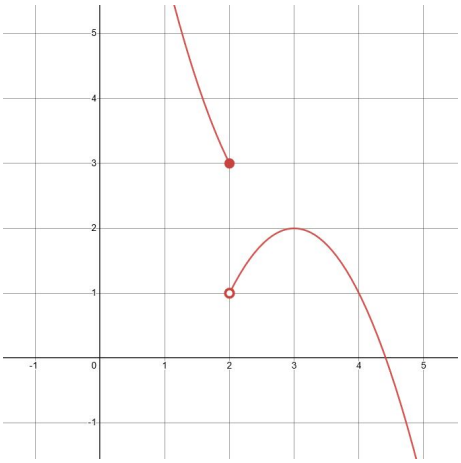
6. In each part, a graph of $y = f(x)$ is shown and a c-value is given. Use the graph to find the indicated quantities, whenever they exist. (If a limit is infinite, say "∞" or "$-\infty$" as appropriate. If a limit does not otherwise exist, say DNE.)

(a) $c = 2$



(i) $\lim_{x \to c} f(x)$ (ii) $f(c)$

(b) $c = 2$



(i) $\lim_{x \to c^-} f(x)$ (ii) $\lim_{x \to c^+} f(x)$ (iii) $\lim_{x \to c} f(x)$ (iv) $f(c)$

7. Use properties of limits and algebraic methods to find the limit, if it exists. (If a limit is infinite, say "∞" or "$-\infty$" as appropriate. If a limit does not otherwise exist, say DNE.)

$$\lim_{x \to 2} \frac{x^2 - 7x + 10}{x^2 + 5x - 14}$$

8. We are given $f(x) = 62x - 3x^2$ and $f'(x) = 62 - 6x$

(a) Find the instantaneous rate of change of $f(x)$ at $x = 5$.

(b) Find the slope of the tangent to the graph of $f(x)$ at $x = 5$.

(c) Find the point (x, y) on the graph of $f(x)$ at $x = 5$.

9. Let $f(x) = 8x^2 + 3x$. This problem asks you to find $f'(x)$ by using the definition of derivative. The five steps are outlined for you. For parts (a) through (e), simplify the given expression.

(a) $f(x+h) =$

(b) $f(x) =$

(c) $f(x+h) - f(x) =$

(d) $\dfrac{f(x+h) - f(x)}{h} =$

(e) $f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h} =$

10. Find the derivative of the function.

(a) $f(x) = 4x^7 - 6x^9$

(b) $g(x) = 6x^{-2} + 4x^{-5}$

(c) $h(x) = x^{2/3} + x^{-3/5}$