Test Number: 1397

MA 15800   Exam 2   Spring 2025

Student Name: _____   Section Number: _____

1. Fill out your name and section number (see table below) in the space provided above. On the scantron, fill in your name, section number (see table below), test number (see above), and your student ID number (with two leading zeros). Sign your name.

2. You can write in this exam booklet. Turn in both your scantron and your exam booklet when you are done. Note: grades are determined only by your scantron answer sheet.

3. Only a TI-30Xa scientific calculator is allowed. No other electronic devices are allowed. No books or notes are allowed.

4. The exam questions are self-explanatory. Please do not ask the proctor to explain or interpret any of the exam questions.

5. There are 15 questions. You will have 60 minutes to complete the exam. Good luck!

Section	Class Meeting Time	Instructor
001	4:30 pm	Conner Partaker
003	3:30 pm	Conner Partaker
300	8:30 am	Jill Shalabi
400	7:30 am	Susitha Karunaratne
999	distance learning	Jill Shalabi

Factoring Formulas

$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$
$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

Sphere

$V = \frac{4}{3}\pi r^3 \qquad S = 4\pi r^2$

Compound Interest

$A = P\left(1 + \frac{r}{n}\right)^{nt} \qquad A = Pe^{rt}$

Closed Right Circular Cylinder

$V = \pi r^2 h \qquad S = 2\pi rh + 2\pi r^2$

Closed Right Circular Cone

$V = \frac{1}{3}\pi r^2 h \qquad S = \pi r\sqrt{r^2 + h^2} + \pi r^2$

Pythagorean Identity

$sin^2\,\theta + cos^2\,\theta = 1$

Problem 1

(6.67 points)

Find the $y-$intercept of $f(x) = 6x^2 - 5x - 4$.

1. (A) $\left(0, -\dfrac{1}{2}\right)$

   (B) $(0, -4)$

   (C) $\left(\dfrac{4}{3}, 0\right)$

   (D) $(-4, 0)$

   (E) $\left(0, \dfrac{4}{3}\right)$

   (F) $\left(-\dfrac{1}{2}, 0\right)$

Problem 2

(6.67 points)

Determine the end behavior of $f(x) = -4x^2 (x+3)^3 (x-5)^7$.

2. (A) As $x \to -\infty$, $y \to +\infty$ and as $x \to +\infty$, $y \to +\infty$.

   (B) As $x \to -\infty$, $y \to -\infty$ and as $x \to +\infty$, $y \to -\infty$.

   (C) As $x \to -\infty$, $y \to +\infty$ and as $x \to +\infty$, $y \to -\infty$.

   (D) As $x \to -\infty$, $y \to -\infty$ and as $x \to +\infty$, $y \to +\infty$.

   (E) As $x \to -\infty$, $y \to 0$ and as $x \to +\infty$, $y \to 0$.

   (F) The end behavior cannot be determined.

Problem 3

(6.67 points)

A company's daily revenue from its best-selling product sold at a price of p dollars can be modeled by $R(p) = 100p - 2p^2$.

At what price p should the company sell this product to maximize daily revenue?

3. **(A)** $100.00

   (B) $200.00

   (C) $0.10

   (D) $2.00

   (E) $50.00

   (F) $25.00

Problem 4

(6.67 points)

Find and simplify the difference quotient $\dfrac{f(x+h) - f(x)}{h}$ for the function $f(x) = 3x^2 - 7x + 15$.

4. **(A)** $3x + 3h$

   (B) $6x - 7$

   (C) $6x - 7 + 3h$

   (D) $6x + 3h$

   (E) $3x - 7$

   (F) $3x - 7 + 3h$

Problem 5

(6.67 points)

Determine the discriminant and the number of real solutions: $x^2 - 2x + 1 = 0$

5. **A** discriminant = 1; two real solutions

   B discriminant = 4; no real solutions

   C discriminant = 0; one real solution

   D discriminant = 0; no real solutions

   E discriminant = 1; one real solution

   F discriminant = 0; two real solutions

Problem 6

(6.67 points)

Compute the average rate of change of the function $f(x) = 2x^3$ on the interval [2,4].

6. **A** 1

   B 2

   C $\dfrac{1}{2}$

   D 224

   E 56

   F $\dfrac{1}{8}$

Problem 7

(6.67 points)

Solve the equation $6x^2 - 5x = 4$.

7. (A) $x = -4$ and $x = -1$

(B) There are no real solutions.

(C) $x = -8$ and $x = 3$

(D) $x = 0$ and $x = \dfrac{4}{3}$

(E) $x = \dfrac{3}{2}$ and $x = 4$

(F) $x = -\dfrac{1}{2}$ and $x = \dfrac{4}{3}$

Problem 8

(6.67 points)

One factor of $f(x) = x^3 - 7x^2 - 14x + 48$ is $x - 2$. What are the real zeros of f?

8. (A) There is not enough information to determine the zeros of f.

(B) $x = 0$ and $x = 2$

(C) $x = 0$

(D) $x = -3$ and $x = 8$

(E) $x = -3$, $x = 2$, and $x = 8$

(F) $x = 2$

Problem 9

(6.67 points)

Select the true statement regarding the function $f(x) = \dfrac{3x^2 + 21x - 90}{2x^2 - 20x + 42}$

9. (**A**) There is one vertical asymptotes and one slant asymptote.

(**B**) There are two horizontal asymptotes.

(**C**) There are no asymptotes.

(**D**) There are two vertical asymptotes and one horizontal asymptote.

(**E**) There are three vertical asymptotes and one horizontal asymptote.

(**F**) There is one vertical asymptote, one horizontal asymptote, and one hole.

Problem 10

(6.67 points)

Determine the range of the function $f(x) = x^2 + 4x - 12$.

10. (**A**) $(-\infty, \infty)$

(**B**) $[-2, \infty)$

(**C**) The range cannot be determined.

(**D**) $[-16, \infty)$

(**E**) $(-\infty, -2)$

(**F**) $(-\infty, -2]$

Problem 11

(6.67 points)

Find the horizontal asymptote of the graph of the function $f(x) = \dfrac{3x^3 + 6x^2 - 5x - 10}{x^2 + 3x - 10}$.

11. (A) $y = -10$

(B) There is no horizontal asymptote.

(C) $y = 3x$

(D) $y = 3$

(E) $y = 0$

(F) $y = -5$ and $y = 2$

Problem 12

(6.67 points)

Rewrite the given quadratic function in standard form: $f(x) = 3x^2 - 18x + 22$

12. (A) $f(x) = 3x\,(x - 6)^2 - 22$

(B) $f(x) = 3\,(x + 3)^2 - 22$

(C) $f(x) = 3\,(x - 3)^2 - 5$

(D) $f(x) = 3\,(x - 3)^2 + 31$

(E) $f(x) = x\,(3x - 11)^2$

(F) $f(x) = 3\,(x - 3)^2 + 13$

Problem 13

(6.67 points)

Find the $y-$intercept of the function $f(x) = 7\,(x-4)(x+2)^2$.

13. **A** $(0,-112)$

   B $(0,-2)$, $(0,4)$, and $(0,7)$

   C $(0,-56)$

   D $(0,0)$

   E $(0,7)$

   F There is no $y-$intercept.

Problem 14

(6.67 points)

Find all of the vertical asymptotes of the following rational function:

$$f(x) = \frac{5x+5}{x^2+7x+6}$$

14. **A** $x = -6$ and $x = -1$

   B $x = 5$

   C There are no vertical asymptotes.

   D $x = -1$

   E $x = 1$

   F $x = -6$

Problem 15

(6.67 points)

Choose the function that has the following properties:

      i) Vertical asymptotes at $x = 7$ and $x = -5$

      ii) Hole at $x = 1$

      iii) Zero at $x = 3$

      iv) Horizontal asymptote $y = 1$

15. (**A**) $f(x) = \dfrac{(x-1)\,(x-3)^2}{(x-7)(x-1)(x+5)}$

    (**B**) $f(x) = \dfrac{(x+1)\,(x+3)^2}{(x+7)(x+1)(x-5)}$

    (**C**) $f(x) = \dfrac{(x-7)\,(x-1)(x+5)}{(x-1)(x-3)^2}$

    (**D**) $f(x) = \dfrac{(x+1)\,(x+3)}{(x+7)(x+1)(x-5)}$

    (**E**) $f(x) = \dfrac{(x-1)\,(x-3)}{(x-7)(x-1)(x+5)}$

    (**F**) $f(x) = \dfrac{(x-7)\,(x-1)(x+5)}{(x-1)(x-3)}$