Student: ____________________	**Instructor:**	**Assignment:** Practice Problems for Test 2
Date: ____________________	**Course:** Math 1540 W OL	

1. At what points is the following function continuous?

$$y = \frac{x+4}{x^2 - 7x + 10}$$

- **A.** The function is continuous at all x except $x = -5$ or $x = 2$.
- **B.** The function is continuous at all x except $x = -2$ and $x = 5$.
- **C.** The function is continuous at all x except $x = 2$ and $x = 5$.
- **D.** The function is continuous at all x except $x = 2$.
- **E.** The function is continuous at all x.

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2. Find y'.

$$y = (x^2 - 4x + 2)(3x^3 - x^2 + 4)$$

- **A.** $15x^4 - 52x^3 + 30x^2 + 4x - 16$
- **B.** $3x^4 - 48x^3 + 30x^2 + 4x - 16$
- **C.** $3x^4 - 52x^3 + 30x^2 + 4x - 16$
- **D.** $15x^4 - 48x^3 + 30x^2 + 4x - 16$

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3. Find y'.

$$y = \left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$$

- **A.** $2x + \frac{1}{x^2}$
- **B.** $2x - \frac{1}{x^2}$
- **C.** $2x + \frac{1}{x^3}$
- **D.** $2x + \frac{2}{x^3}$

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4. Find the limit.

$$\lim_{x \to (-\pi/2)^-} \sec x$$

- **A.** 0
- **B.** ∞
- **C.** 1
- **D.** $-\infty$
- **E.** The limit does not exist.

5. Find the limit, if it exists.

$$\lim_{x \to 5} \frac{x^2 - 2x - 15}{x + 3}$$

- A. 5
- B. -8
- C. 0
- D. The limit does not exist.

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6. Find $\frac{dy}{dt}$.

$y = \cos^5(\pi t - 9)$

- A. $5\cos^4(\pi t - 9)$
- B. $-5\cos^4(\pi t - 9)\sin(\pi t - 9)$
- C. $-5\pi\cos^4(\pi t - 9)\sin(\pi t - 9)$
- D. $-5\pi\sin^4(\pi t - 9)$

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7. Use implicit differentiation to find $\frac{dy}{dx}$.

$2xy - y^2 = 1$

- A. $\frac{y}{x - y}$
- B. $\frac{y}{y - x}$
- C. $\frac{x}{y - x}$
- D. $\frac{x}{x - y}$

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8. Find the derivative of the function $y = \sqrt{-7 - 3x}$.

$\frac{dy}{dx} =$ ______________

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9. Find the limit, if it exists.

$$\lim_{x \to 5} \frac{x^2 - 8x + 15}{x^2 - 2x - 15}$$

- A. 1
- B. $-\frac{1}{4}$
- C. $\frac{1}{4}$
- D. The limit does not exist.

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10. Find the derivative of y with respect to x.

$y = \textbf{ln}\, 8x^2$

- A. $\frac{1}{2x + 8}$
- B. $\frac{2}{x}$
- C. $\frac{16}{x}$
- D. $\frac{2x}{x^2 + 8}$

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11. Use a reference triangle to find the given angle.

$$\textbf{sin}^{-1}\left(\frac{1}{2}\right)$$

$\textbf{sin}^{-1}\left(\frac{1}{2}\right) =$ ____________

(Type an exact answer in terms of π.)

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12. Find $\frac{dy}{dx}$ for $y = \frac{2}{x} + 9\,\textbf{sin}\, x$.

$\frac{d}{dx}\left(\frac{2}{x} + 9\,\textbf{sin}\, x\right) =$ ____________

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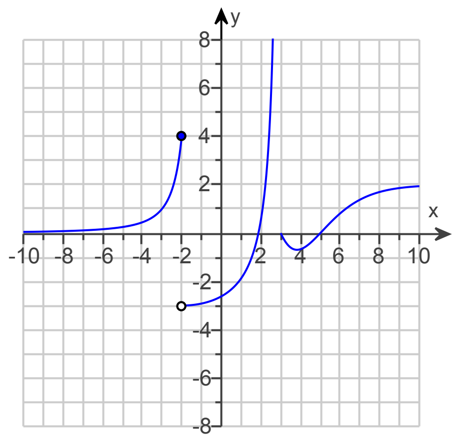
13. Use implicit differentiation to find $\frac{dy}{dx}$ using the following equation.

$$x^5 + y^5 = 35xy$$

$\frac{dy}{dx} =$ ____________

14. Using the following graph of the function f, evaluate the limits **(a)** through **(i)**.



(a) Select the correct choice below and fill in the answer box within the choice.

- **A.** $\lim_{x \to 5} f(x) =$ ________
- **B.** $\lim_{x \to 5} f(x)$ does not exist.

(b) $\lim_{x \to -2^+} f(x) =$ ________

(c) $\lim_{x \to -2^-} f(x) =$ ________

(d) Select the correct choice below and fill in the answer box within the choice.

- **A.** $\lim_{x \to -2} f(x) =$ ________
- **B.** $\lim_{x \to -2} f(x)$ does not exist.

(e) $\lim_{x \to 3^+} f(x) =$ ________

(f) $\lim_{x \to 3^-} f(x) =$ ________

(g) Select the correct choice below and fill in the answer box within the choice.

- **A.** $\lim_{x \to 3} f(x) =$ ________
- **B.** $\lim_{x \to 3} f(x)$ does not exist.

(h) $\lim_{x \to \infty} f(x) =$ ________

(i) $\lim_{x \to -\infty} f(x) =$ ________

15. Does the graph of the function below have any horizontal tangents in the interval $0 \le x \le 2\pi$? If so, where? If not, why not? Visualize your findings by graphing the function with a grapher.

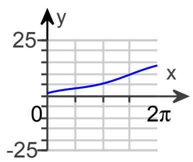
$y = x - 2 \sin x$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

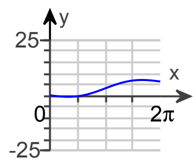
- **A.** The function has a horizontal tangent at x = ____________.
  (Type your answer in radians. Type an exact answer in terms of π. Use a comma to separate answers as needed.)
- **B.** The function has no horizontal tangents in the interval $0 \le x \le 2\pi$ because it is never zero in the interval $0 \le x \le 2\pi$.
- **C.** The function has no horizontal tangents in the interval $0 \le x \le 2\pi$ because it is defined at every point in the interval $0 \le x \le 2\pi$.
- **D.** The function has no horizontal tangents in the interval $0 \le x \le 2\pi$ because its derivative is never zero in the interval $0 \le x \le 2\pi$.

Confirm the result visually by graphing $y = x - 2 \sin x$. Choose the correct graph below.

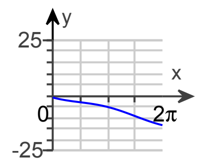
A.



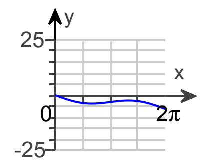
B.



C.



D.



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16. Find the limit.

$$\lim_{x \to 5^+} \frac{3}{x^2 - 25}$$

- **A.** 1
- **B.** $-\infty$
- **C.** ∞
- **D.** 0

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17. Assume that $x = x(t)$ and $y = y(t)$. Let $y = x^3 + 3$ and $\frac{dx}{dt} = 3$ when $x = 1$.

Find $\frac{dy}{dt}$ when $x = 1$.

$\frac{dy}{dt}$ = ____________ (Simplify your answer.)

18. Use logarithmic differentiation to find the derivative of y.

$y = x(x+4)(x+7)$

- **A.** $\frac{1}{x} + \frac{1}{x+4} + \frac{1}{x+7}$
- **B.** 1
- **C.** $x(x+4)(x+7)(\ln x + \ln(x+4) + \ln(x+7))$
- **D.** $x(x+4)(x+7)\left(\frac{1}{x} + \frac{1}{x+4} + \frac{1}{x+7}\right)$

19. Find an equation for the line tangent to $y = -5 - 6x^2$ at $(-3, -59)$.

The equation for the line tangent to $y = -5 - 6x^2$ at $(-3, -59)$ is y = ____________.

20. Find the derivative.

$s = 5t^2 + 8t + 3$

- **A.** $5t + 8$
- **B.** $10t + 8$
- **C.** $10t^2 + 8$
- **D.** $5t^2 + 8$

21. Use $\lim_{x \to 0} \frac{\sin x}{x} = 1$ to find $\lim_{x \to 0} \frac{\sin 5x}{x}$.

- **A.** $\frac{1}{5}$
- **B.** 5
- **C.** 1
- **D.** The limit does not exist.

22. Find the limit.

$$\lim_{x \to \infty} \frac{-3x^2 - 2x + 3}{-10x^2 + 8x + 14}$$

- **A.** 1
- **B.** $\frac{3}{10}$
- **C.** $\frac{3}{14}$
- **D.** ∞

23. At time $t \geq 0$, the velocity of a body moving along the s-axis is $v = t^2 - 6t + 5$. When is the body moving backward?

- A. $t > 5$
- B. $1 < t < 5$
- C. $0 \leq t < 5$
- D. $0 \leq t < 1$

24. Find the limit.

$$\lim_{x \to \infty} \frac{x^2 + 3x + 17}{x^3 - 7x^2 + 14}$$

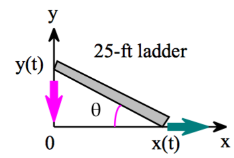
- A. $\frac{17}{14}$
- B. ∞
- C. 0
- D. 1

25. The function $s = f(t)$ gives the position of a body moving on a coordinate line, with s in meters and t in seconds. Find the body's speed and acceleration at the end of the time interval.

$s = 8t - t^2$, $0 \leq t \leq 8$

- A. 8 m/sec, -2 m/sec^2
- B. 8 m/sec, -16 m/sec^2
- C. -8 m/sec, -2 m/sec^2
- D. 24 m/sec, -16 m/sec^2

26. A 25 ft ladder is leaning against a house when its base starts to slide away. By the time the base is 24 ft from the house, the base is moving away at the rate of 7 ft/sec.
What is the rate of change of the height of the top of the ladder?



The rate of change of the height of the top of the ladder is ____________ ft/sec.
(Simplify your answer.)

1. C. The function is continuous at all x except $x = 2$ and $x = 5$.

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2. A. $15x^4 - 52x^3 + 30x^2 + 4x - 16$

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3. D. $2x + \frac{2}{x^3}$

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4. D. $-\infty$

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5. C. 0

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6. C. $-5\pi \cos^4(\pi t - 9) \sin(\pi t - 9)$

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7. B. $\frac{y}{y - x}$

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8. $-\frac{3}{2\sqrt{-7-3x}}$

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9. C. $\frac{1}{4}$

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10. B. $\frac{2}{x}$

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11. $\frac{\pi}{6}$

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12. $-\frac{2}{x^2} + 9 \cos x$

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13. $\frac{7y - x^4}{y^4 - 7x}$

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14. A. $\lim_{x \to 5} f(x) =$ **0**

-3

4

B. $\lim_{x \to -2} f(x)$ does not exist.

0

∞

B. $\lim_{x \to 3} f(x)$ does not exist.

2

0

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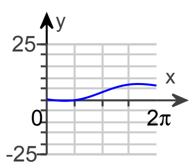
15. A. The function has a horizontal tangent at $x = \mathbf{\frac{5\pi}{3}, \frac{\pi}{3}}$.

(Type your answer in radians. Type an exact answer in terms of π. Use a comma to separate answers as needed.)



B.

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16. C. ∞

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17. 9

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18. D. $x(x+4)(x+7)\left(\frac{1}{x} + \frac{1}{x+4} + \frac{1}{x+7}\right)$

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19. $36x + 49$

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20. B. $10t + 8$

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21. B. 5

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22. B. $\frac{3}{10}$

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23. B. $1 < t < 5$

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24. C. 0

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25. A. 8 m/sec, -2 m/sec^2

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26. -24 ft/sec