1. Sketch the graph: \( h(x) = x^2 \)

2. If \( g(x) = 3^x \), what is \( g(-2) \)?

   a) -9  b) -6  c) \(-\frac{1}{9}\)  d) \(\frac{1}{9}\)  e) 9
Calculus Quiz #2

1. Sketch the graph: \( f(x) = |x| \)

2. The equation of the line through the point \((6,0)\) with slope \(m = -\frac{1}{2}\) is

A) \(y = -\frac{1}{2}x + 6\)
B) \(y = \frac{1}{2}x + 6\)
C) \(y = 2x + 3\)
D) \(y = -2x + 6\)
E) \(y = -\frac{1}{2}x + 3\)
Calculus Quiz #3

1. Factor: $x^2 + 5x - 6$

2. Evaluate: $\frac{53^{2001}}{53^{2000}}$
1. For what value(s) of $x$ is

$$f(x) = \frac{x - 4}{x - 3}$$

undefined?

2. Find the area of the trapezoid

![Trapezoid Diagram]

- 10 ft
- 14 ft
- 6 ft
1. For what values of $t$ does $9t^2 - 30t + 64 = 0$?

2. Sketch the graph of a parabola that is not a function.
1. The domain of $f(x) = \sqrt{\frac{x}{x+1}}$ is
   
   A) $|x| \geq 0$  
   B) $|x| \geq -1$
   
   C) $x < -1$ and $x > 0$
   
   D) $x \leq -1$ and $x \geq 0$
   
   E) $x < -1$ and $x \geq 0$

2. Sketch the fundamental cycle of $y = \cos 2x$. 
1. The domain of the function 
\[ f(x) = \sqrt{1 + \sin x} \] is 
A) \( x \neq \pi/2 \) 
B) \( x \geq 0 \) 
C) \( x > 0 \) 
D) \( -1 \leq x \leq 1 \) 
E) all reals

2. The line through the points \((-4, 7)\) and \((5, -2)\) will cross the x-axis at 
A) \((-3,0)\) 
B) \((3, 0)\) 
C) \((-1,0)\) 
D) \((1,0)\) 
E) \((2,0)\)
1. Which of the following does NOT have a period of $\pi$?

A) $f(x) = \sin\left(\frac{x}{2}\right)$  
B) $f(x) = |\sin x|$

C) $f(x) = \tan x$  
D) $f(x) = \sin^2 x$

E) $f(x) = \tan^2 x$

2. What is 50 divided by $1/2$?
1. Let \( f(x) = \left| \sin x - \frac{1}{2} \right| \). The maximum value attained by \( f(x) \) is

A) \( \frac{1}{2} \)  \quad B) 1  \quad C) \( \frac{3}{2} \)

D) 2  \quad E) 5

2. Sketch the graph of a decreasing exponential function.
1. Sketch the graph of a function with a jump discontinuity at \( x = 2 \).

2. If \( f(x) = x^3 + 3x^2 + 4x + 5 \) and \( g(x) = 5 \), then \( g(f(x)) = \)

A) \( 5x^2 + 15x + 25 \)
B) \( 5x^3 + 15x^2 + 20x + 25 \)
C) 1125
D) 225
E) 5
1. Sketch the graph of a function with a removable discontinuity at (2, 5).

2. Is $f(x) = \sin(x)$ increasing or decreasing at $x = 2$?
Calculus Quiz #12

1. Sketch the graph of a function where 3 is the limit as x approaches 2 but f(x) is undefined.

2. How far will you travel in 20 minutes at 30 mi/hr?
1. Sketch the graph of a function that is decreasing slowly when $x = -4$.

2. Factor: $x^2 - 100$
1. A particle moves along the x-axis so that at any time $t > 0$ its position is given by $x(t) = 48t - 3t^2$. What is the average velocity of the particle between $t = 0$ and $t = 2$?

A) 84  
B) 42  
C) 36  
D) 24  
E) 18

2. Sketch the graph of $y = (x - 2)^2 - 5$. 
1. Sketch the graph of a function with a vertical asymptote at \( x = 2 \).

2. The RANGE of the function \( f(x) = 4 \sin(2x) +1 \) is
   
   A) \( \{-4 \leq y \leq 4\} \)  
   B) \( \{|y+1| \leq 4\} \)  
   C) \( \{0 \leq y \leq 4\} \)  
   D) \( \{-5 \leq y \leq 3\} \)  
   E) \( \{|y-1|\leq 4\} \)
1. What type of function has a graph like Figure 1?

2. Find: \( \lim_{x \to 3} 5x^2 \)
Calculus Quiz #17

1. Mark the interval in Figure 1 where the function is decreasing.

2. Find $\frac{dy}{dx}$ if $y = 3x^4$. 

Figure 1
1. If \( y = \frac{3}{4 + x^2} \), then \( \frac{dy}{dx} = \)

A) \( \frac{-6x}{(4 + x^2)^2} \)
B) \( \frac{3x}{(4 + x^2)^2} \)
C) \( \frac{6x}{(4 + x^2)^2} \)
D) \( \frac{-3x}{(4 + x^2)^2} \)
E) \( \frac{3}{2x} \)

2. Evaluate: 5!
Calculus Quiz #19

1. If \( f(x) = x \), then \( f '(5) = \)
   
   A) 0  
   B) \( \frac{1}{2} \)  
   C) 1  
   D) 5  
   E) \( \frac{25}{2} \)  

2. Sketch the graph of \( f(x) = \log(x-2) \)
Calculus Quiz #20

1. If \( f(x) = (x^2 - 1)(x^3 + 1) \), then \( f'(1) = \)

A) 10  B) 8  C) 6  D) 4  E) 2

2. If \( f(x) = \frac{x - 1}{x + 1} \), then \( f'(1) = \)

A) -1  B) \( \frac{-1}{2} \)  C) 0  D) \( \frac{1}{2} \)  E) 1
1. A particle moves along the x-axis so that its position is given by \( x(t) = t^3 - 3t^2 - 9t + 1 \). For what values of \( t \) is the particle at rest?

A) None  B) 1 only  C) 3 only  D) 5 only  E) 1 and 3

2. Sketch the graph of the derivative of the function.
1. An equation of the line tangent to the graph of \( f(x) = x(1-2x)^3 \) at the point \((1, -1)\) is

A) \( y = -7x + 6 \)  B) \( y = -6x + 5 \)  
C) \( y = -2x + 1 \)  D) \( y = 2x - 3 \)  
E) \( y = 7x - 8 \)

2. Find: \( \lim_{x \to 0} \frac{13x}{x} \)
Calculus Quiz #23

1. If \( x^2 + xy + y^3 = 0 \), then \( \frac{dy}{dx} = \)

A) \( -\frac{2x+y}{x+3y^2} \)  
B) \( -\frac{x+3y^2}{2x+y} \)  
C) \( \frac{-2x}{x+3y^2} \)  
D) \( \frac{2x}{x+3y^2} \)  
E) \( -\frac{2x+y}{x+3y^2-1} \)

2. If \( f(x) = \sqrt{2x} \), then \( f'(1) = \)

A) \( \frac{1}{4} \)  
B) \( \frac{1}{2} \)  
C) \( \frac{\sqrt{2}}{2} \)  
D) \( 1 \)  
E) \( \sqrt{2} \)
Calculus Quiz #24

1. If \( f(x) = x^5 - 1 \), the inverse function of \( f \), is defined by \( f^{-1} = \)
   
   A) \( \frac{1}{\sqrt[5]{x+1}} \)  
   B) \( \frac{1}{\sqrt[5]{x+1}} \)  
   C) \( \frac{5}{\sqrt[5]{x-1}} \)  
   D) \( \frac{5}{\sqrt[5]{x-1}} \)  
   E) \( \frac{5}{\sqrt[5]{x+1}} \)

2. If \( x^2 - 3xy + y^2 = -1 \), then at the point \( (1,1) \), \( \frac{dy}{dx} = \)

   A) 1  
   B) -2  
   C) -1  
   D) 2  
   E) nonexistent
1. Let \( f(x) = \frac{1}{k} \cos(kx) \). For what value of \( k \) does \( f \) have a period of 3?

A) \( \frac{2}{3} \)  
B) \( \frac{2\pi}{3} \)  
C) \( \frac{3\pi}{2} \)  
D) 6  
E) \( 6\pi \)

2. The slope of the tangent line to the curve \( xy^3 + y^2x^2 = 6 \) at \((2, 1)\) is

A) \( \frac{3}{2} \)  
B) -1  
C) \( \frac{-5}{14} \)  
D) \( \frac{-3}{14} \)  
E) 0
Calculus Quiz #26

1. Let \( y = x^2 \cos(x) \). \( \frac{dy}{dx} = \)
   A) \( 2x \sin(x) \)
   B) \( 2x \cos(x) + x \sin(x) \)
   C) \( 2x \cos(x) - x^2 \sin(x) \)
   D) \( 2x \cos(x) + x^2 \sin(x) \)
   E) \( 2x \cos(x) - x \sin(x) \)

2. If \( y = \frac{\sin(x)}{\cos(x)} \), then \( \frac{dy}{dx} = \)
   A) \( \sec^2(x) \)
   B) \( \frac{\cos(x)}{\sin(x)} \)
   C) \( \frac{\cos(x)}{-\sin(x)} \)
   D) \( \cot(x) \)
   E) \( \sec(x) \)
1. Let $y = \tan^2(3x)$. \( \frac{dy}{dx} = 

A) 2\tan(3x) \\
B) 6\tan(3x) \\
C) 6\tan(3x)\sec^2(3x) \\
D) -6\tan(3x)\sec^2(3x) \\
E) 6\cot(x) \\

2. \( \lim_{h \to 0} \frac{\sin(\pi + h) - \sin(\pi)}{h} = 

A) 0  
B) -1  
C) 1  
D) 0.5  
E) DNE
Calculus Quiz #28

1. If \( x + 7y = 29 \), is an equation of the line normal to the graph of \( f(x) \) at the point \((1, 4)\), then \( f'(x) = \)

A) \( 7 \)  B) \( \frac{1}{2} \)  C) \( -\frac{1}{7} \)  D) \( -\frac{7}{29} \)

E) \(-7\)

2. If \( y^2 - 2xy = 16 \), then \( \frac{dy}{dx} = \)

A) \( \frac{x}{y-x} \)  B) \( \frac{y}{x-y} \)  C) \( \frac{y}{y-x} \)

D) \( \frac{y}{2y-x} \)  E) \( \frac{2y}{x-y} \)
Calculus Quiz #29

1. If $f(x) = x\sqrt{x}$, then $f'(1) =$
   
   A) $\frac{1}{2}$  B) $-\frac{1}{2}$  C) $\frac{3}{2}$  D) $-\frac{3}{2}$  
   E) $\frac{2}{3}$

2. If the line $y = 3x - 5$ is tangent to the graph of $y = f(x)$ at the point $(4, 7)$
   
   then $\lim_{x \to 0} \frac{f(4+x) - f(4)}{x}$ is
   
   A) -5  B) 3  C) 4  D) 7  E) Nonexistent
Calculus Quiz #30

1. If f is a continuous function on [a, b], which of the following must be true?

   A) f ‘ exists on (a, b)
   B) If f(x₀) is a maximum of f, then f ’(x₀)=0
   C) lim_{x→0} f(x)=f(lim_{x→0}) for all x₀ in (a,b)
   D) f ‘(x) = 0 for some x in (a,b)
   E) the graph of f ‘(x) is a straight line.

2. The position of a particle moving along a straight line at any time t is given by s(t) = t² + 4t + 4. What is the acceleration of the particle when t= 4?

   A) 0     B) 2     C) 4     D) 8     E) 12
Calculus Quiz #31

1. If \( \frac{dy}{dx} = \cos(2x) \), then \( y = \)

A) \( -\frac{1}{2}\cos(2x) + C \)  
B) \( -\frac{1}{2}\cos^2(2x) + C \)  
C) \( \frac{1}{2}\sin(2x) + C \)  
D) \( \frac{1}{2}\sin^2(2x) + C \)  
E) \( -\frac{1}{2}\sin^2(2x) + C \)  

2. The absolute maximum value of \( f(x) = x^3 - 3x^2 + 12 \) on the closed interval \([-2, 4]\) occurs when \( x = \)

A) 4  
B) 2  
C) 1  
D) 0  
E) -2
1. What is \( \lim_{x \to \infty} \frac{x^2-4}{2+x-4x^2} \) ?

A) -2  B) -\frac{1}{4}  C) \frac{1}{2}  D) 1  E) DNE

2. Find the value of \( c \) on the interval \([0,4]\) which satisfies the Mean value Theorem for \( y = \sqrt{x} \)

A) -2  B) 1  C) 2  D) \frac{1}{2}  E) None
1. The sides of the rectangle increase in such a way that $\frac{dz}{dt} = 1$ and $\frac{dx}{dt} = 3\frac{dy}{dt}$. At the instant that $x = 4$ and $y = 3$ what is the value of $\frac{dx}{dt}$?

A) $\frac{1}{3}$  B) 1  C) 2  D) $\sqrt{5}$  E) 5

2. A polynomial $p(x)$ has local maxima at (-2,4) and (5,7) and a local minimum at (1,1) and no other critical points. How many roots does $p(x)$ have?

A) 1  B) 2  C) 3  D) 4  E) 5
1. The graph of $f(x)$ is shown. Mark the intervals where
\[
\frac{dy}{dx} > 0 \text{ and } \frac{d^2y}{dx^2} < 0
\]

2. If $f(x) = x + \sin x$, then $f'(x) =$

A) $1 + \cos (x)$  B) $1 - \cos x$
C) $\cos x$       D) $\sin x - \cos x$
E) $\sin x + \cos x$
Calculus Quiz #35

1. \( \int_{0}^{1} |x-1| \, dx = \)

   A) 1  B) -1  C) -1/2  
   D) 1/2  E) None of these

2. If \( F \) and \( f \) are continuous functions such that \( F'(x) = f(x) \) for all \( x \), then

   \[ \int_{a}^{b} f(x) \, dx = \]

   A) \( F'(a) - F'(b) \)  B) \( F'(b) - F'(a) \)  
   C) \( F(a) - F(b) \)  D) \( F(b) - F(a) \)  
   E) None of the above
Calculus Quiz #36

1. \( \int_{-1}^{2} \frac{|x|}{x} \, dx = \)
   
   A) -3  B) 1  C) 2  D) 3  E) Nonexistent

2. For what non-negative value of \( b \) is the line given by \( y = -\frac{1}{3}x + b \) normal to the curve \( y = x^3 \).
   
   A) 0  B) 1  C) 4/3  D) 10/3  E) \( \frac{10\sqrt{3}}{3} \)
1. If $f(x) = x + \sin(x)$, then $f'(x) = $ 

A) $1 + \cos(x)$  
B) $1 - \cos(x)$  
C) $\cos(x)$  
D) $\sin(x) - \cos(x)$  
E) $\sin(x) + \cos(x)$

2. Which of the following equations has a graph that is symmetric with respect to the origin?

A) $y = \frac{x+1}{x}$  
B) $y = -x^5 + 3x$  
C) $y = x^4 - 2x^2 + 6$  
D) $y = (x-1)^3 - 1$  
E) $y = (x^2+1)^2 - 1$
1. $\int_0^3 (x + 1)^2 \, dx = \frac{1}{3}$
   A) $\frac{21}{2}$  B) $7$  C) $\frac{16}{3}$  D) $\frac{14}{3}$  E) $-\frac{1}{4}$

2. If $\int_1^{10} f(x) \, dx = 4$ and $\int_1^3 f(x) \, dx = 7$,
   then $\int_1^3 f(x) \, dx = 5$
   A) $-3$  B) $0$  C) $3$  D) $10$  E) $11$
1. If \( f(x) = \frac{1}{3}x^3 - 4x^2 + 12x - 5 \) and the domain is the set of all \( x \) such that \( 0 \leq x \leq 9 \), then the absolute minimum value of the function, \( f \) occurs when \( x \) is

A) 0  B) 2  C) 4  D) 6  E) 9

2. A polynomial \( p(x) \) has a relative maximum at (-2, 4), a relative minimum at (5, 7) and no other critical points. How many zeros does \( p(x) \) have?

A) One  B) Two  C) Three  D) Four  E) Five
Calculus Quiz #40

1. A curve in the plane is defined parametrically by the equations $x = t^3 + t$ and $y = t^4 + 2t^2$. An equation of the line at $t = 1$ is

A) $y = 2x$  
B) $y = 8x$  
C) $y = 2x - 1$  
D) $y = 4x + 13$  
E) $y = 8x + 13$

2. Let $f$ and $g$ be functions that are differentiable everywhere. If $g$ is the inverse function of $f$ and $g(-2) = 5$ and $f'(5) = 1/2$, then $g'(-2)$ is

A) -2  
B) 1/2  
C) 1/5  
D) -1/5  
E) 2
1. \( \lim_{h \to 0} \frac{\int_{h}^{h+1} \sqrt{x^5 + 8}}{h} \) is

A) 0  
B) 1  
C) 3  
D) \(2\sqrt{2}\)
E) Nonexistent

2. The graph of \(y = f(x)\) is shown above. How many points of inflection does the graph have?

A) One  
B) Two  
C) Three  
D) Four  
E) Five
Calculus Quiz #42

1. If $f$ is a function such that
   \[ \lim_{x \to 2} \frac{f(x) - f(2)}{x - 2} = 0, \]
   which of the following must be true?
   A) The limit $\lim_{x \to 2} f(x)$ does not exist.
   B) $f$ is not defined at $x = 2$.
   C) The derivative of $f$ at $x = 2$ is 0.
   D) $f$ is continuous at $x = 0$.
   E) $f(2) = 0$

2. The average value of $\sqrt{x}$ over the interval $[0, 2]$ is
   \[ \frac{\sqrt{2}}{3}, \frac{\sqrt{2}}{2}, \frac{2\sqrt{2}}{3}, 1, \frac{4\sqrt{2}}{3} \]
   A) $\frac{\sqrt{2}}{3}$  B) $\frac{\sqrt{2}}{2}$  C) $\frac{2\sqrt{2}}{3}$
   D) 1  E) $\frac{4\sqrt{2}}{3}$
1. The function defined by \( f(x) = x^3 - 3x^2 \) for all real numbers \( x \) has a relative minimum at \( x = \) 

A) -2  B) 0  C) 1  D) 2  E) 4

2. \( \int_{1}^{2} \frac{x^2 - 1}{x - 1} \, dx = \)

A) 1/2  B) 1  C) 2  
D) 5/2  E) 3/2
Calculus Quiz #44

1. The region in the first quadrant bounded by the graph of \( y = \sec x \), \( x = \pi \), and the axes is rotated about the x-axis. What is the volume of the solid generated?

A) \( \frac{\pi^2}{4} \)  
B) \( \pi - 1 \)  
C) \( \pi \)  
D) \( 2\pi \)  
E) \( \frac{8\pi}{3} \)

2. Suppose that \( f \) is an odd function; i.e. \( f(-x) = f(x) \). Which of the following must necessarily be equal to \( f'(x_0) \)?

A) \( f'(x_0) \)  
B) \( -f'(x_0) \)  
C) \( \frac{1}{f'(x_0)} \)  
D) \( \frac{-1}{f'(x_0)} \)  
E) None of these
1. \( \int_{0}^{1} x(x^2 + 2)^2 \, dx = \)

A) \(19/2\)  B) \(19/3\)  C) \(9/2\)
D) \(19/6\)  E) \(1/6\)

2. \( \int_{1}^{4} |x-3| \, dx = \)

A) \(-3/2\)  B) \(3/2\)  C) \(5/2\)
D) \(9/2\)  E) \(5\)
1. If the function $f$ has a continuous derivative on $[0, c]$, then $\int_0^c f'(x) \, dx =$
   
   A) $f(x) - f(0)$  
   B) $|f(c) - f(0)|$  
   C) $f(c)$  
   D) $f(x) + c$  
   E) $f''(c) - f''(0)$

2. At $t = 0$ a particle starts at rest and moves along a line in such a way that at time $t$, its acceleration is $24t^2$ ft/sec$^2$. How far in feet will the particle travel in the first 2 seconds?
   
   A) 32  
   B) 48  
   C) 64  
   D) 96  
   E) 192
Calculus Quiz #49

1. If the solutions of \( f(x) = 0 \) are -1 and 2, then the solutions of \( f(x/2) = 0 \) are

A) -1 and 2  
B) -1/2 and 5/2  
C) -1.5 and 1.5  
D) -1/2 and 1  
E) -2 and 4

2. For which of the following functions does the property \( \frac{d^3y}{dx^3} = \frac{dy}{dx} \) hold?

I. \( y = e^x \)
II. \( y = e^{-x} \)
III. \( y = \sin(x) \)

A) I only  
B) II only  
C) III only  
D) I and II  
E) II and III
Calculus Quiz #50

1. If $\frac{dt}{dt} = -2y$ and if $y = 1$ when $t = 0$, what is the value of $t$ for which $y = 1/2$?

A) $-\frac{\ln2}{2}$  B) $-\frac{1}{4}$  C) $\ln2$

D) $\frac{\sqrt{2}}{2}$  E) $\frac{\ln2}{2}$

2. If $x = t^3 - t$ and $y = \sqrt{3t + 1}$, then $\frac{dy}{dx}$ at $t = 1$ is

A) $\frac{1}{8}$  B) $\frac{3}{8}$  C) $\frac{3}{4}$  D) $\frac{8}{3}$  E) 8
Calculus Quiz #51

1. \( \int_0^k (2kx - x^2) \, dx = 18 \), then \( k = \)

A) -9    B) -3    C) 3    D) 9    E) 18

2. If \( f(x) = x^2 \cos(x) \), then \( \frac{dy}{dx} \) is

A) \( 2x \sin(x) \)
B) \( -2x \sin(x) \)
C) \( 2x \cos(x) + x^2 \sin(x) \)
D) \( 2x \cos(x) - x^2 \sin(x) \)
E) \( 2x \cos(x) + 2x \sin(x) \)
Calculus Quiz #53

1. A velocity of a particle moving along a straight line at any time $t$ is given by $v(t) = e^t$. How far does the particle travel from $t = 0$ to $t = 2$?

A) $e^2 - 1$  B) $e - 1$  C) $2e$  D) $e^2$

E) $\frac{e}{3}$

2. If $f(x) = \frac{\ln x}{x}$, then $\frac{dy}{dx} =$

A) $\frac{1}{x}$  B) $\frac{1}{x^2}$  C) $\frac{\ln x - 1}{x^2}$

D) $\frac{1 - \ln x}{x^2}$  E) $\frac{1 + \ln x}{x^2}$