This print-out should have 36 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Determine $f'(x)$ when

$$f(x) = \frac{\sin(x) - 4}{\sin(x) + 3}\,.$$

1. $f'(x) = \dfrac{7\sin(x)\cos(x)}{\sin(x)+3}$

2. $f'(x) = \dfrac{\cos(x)}{\sin(x)+3}$

3. $f'(x) = -\dfrac{\sin(x)\cos(x)}{\sin(x)+3}$

4. $f'(x) = \dfrac{7\cos(x)}{(\sin(x)+3)^2}$

5. $f'(x) = -\dfrac{\cos(x)}{(\sin(x)+3)^2}$

6. $f'(x) = -\dfrac{7\cos(x)}{(\sin(x)+3)^2}$

002 10.0 points

Find the derivative of

$$g(x) = 3x\cos(x) - 2\,.$$

1. $g'(x) = 2x\cos(x) + 3\sin(x)$

2. $g'(x) = 2(x\cos(x) - \sin(x))$

3. $g'(x) = 3\cos(x) - 2x\sin(x)$

4. $g'(x) = 3(\cos(x) + x\sin(x))$

5. $g'(x) = 2(x\cos(x) + \sin(x))$

6. $g'(x) = 3(\cos(x) - x\sin(x))$

003 10.0 points

Find the derivative of g when

$$g(x) = x^4\cos(x)\,.$$

1. $g'(x) = x^3(4\sin(x) - x\cos(x))$

2. $g'(x) = x^3(4\sin(x) + x\cos(x))$

3. $g'(x) = x^4(3\sin(x) - \cos(x))$

4. $g'(x) = x^3(4\cos(x) - x\sin(x))$

5. $g'(x) = x^3(4\cos(x) + x\sin(x))$

6. $g'(x) = x^4(3\cos(x) - \sin(x))$

004 10.0 points

Find the derivative of

$$f(x) = 2x\sin(x) - x^2\cos(x)\,.$$

1. $f'(x) = (2 + x^2)\sin(x)$

2. $f'(x) = (x^2 - 2)\sin(x)$

3. $f'(x) = (2 - x^2)\cos(x)$

4. $f'(x) = (x^2 - 2)\cos(x)$

5. $f'(x) = (x^2 + 2)\cos(x)$

6. $f'(x) = (2 - x^2)\sin(x)$

005 10.0 points

Find the derivative of g when

$$g(x) = 8\sec(x) + \tan(x)\,.$$

1. $g'(x) = 8\cos(x)\sec^2(x) + 1 - \sec(x)$

2. $g'(x) = 8\sec(x)\tan(x) + 1 - \tan^2(x)$

3. $g'(x) = 8\sec(x)\tan(x) + \sec^2(x)$

4. $g'(x) = 8\cos(x)\sec^2(x) + 1 + \tan(x)$

5. $g'(x) = 8\sin(x)\sec^2(x) + \cos^2(x)$

---

006 10.0 points

Find the x-intercept of the tangent line to the graph of

$$f(x) = 4x - \cos(x)$$

at the point $(0,\ f(0))$.

1. x-intercept $= -\dfrac{4}{3}$

2. x-intercept $= -4$

3. x-intercept $= \dfrac{1}{4}$

4. x-intercept $= -\dfrac{1}{4}$

5. x-intercept $= 4$

6. x-intercept $= -\dfrac{1}{3}$

---

007 10.0 points

Find the x-intercept of the tangent line to the graph of

$$f(x) = 4\sin(x) - \cos(x)$$

at the point $(0,\ f(0))$.

1. x-intercept $= -\dfrac{1}{4}$

2. x-intercept $= \dfrac{1}{4}$

3. x-intercept $= 4$

4. x-intercept $= -\dfrac{1}{3}$

5. x-intercept $= -\dfrac{4}{3}$

6. x-intercept $= -4$

---

008 10.0 points

Find the derivative of f when

$$f(x) = \frac{\sin x - 1}{\cos x}\,.$$

1. $f'(x) = -\dfrac{1}{\sin x + 1}$

2. $f'(x) = -\dfrac{1}{1 + \cos x}$

3. $f'(x) = \dfrac{1}{1 - \cos x}$

4. $f'(x) = \dfrac{1}{\cos x + 1}$

5. $f'(x) = \dfrac{1}{1 - \sin x}$

6. $f'(x) = \dfrac{1}{1 + \sin x}$

7. $f'(x) = \dfrac{1}{\cos x - 1}$

8. $f'(x) = \dfrac{1}{\sin x - 1}$

---

009 10.0 points

Find the derivative of f when

$$f(x) = \frac{1 - \sin x}{x - \cos x}\,.$$

1. $f'(x) = -\dfrac{x\,\cos x}{(1 + \sin x)^2}$

2. $f'(x) = -\dfrac{x\,\cos x}{(x - \cos x)^2}$

3. $f'(x) = \dfrac{x\,\sin x}{(x - \cos x)^2}$

4. $f'(x) = \dfrac{x\,\cos x}{(x - \cos x)^2}$

5. $f'(x) \;=\; -\dfrac{x\,\sin x}{(x-\cos x)^2}$

---

010 10.0 points

Differentiate

$$y = \frac{\tan x - 5}{\sec x}\,.$$

1. $y' = \cos x + 5\sin x$

2. $y' = \cos x + \sin x$

3. $y' = \cos x - \sin x$

4. $y' = 5\cos x + \sin x$

5. $y' = 5\cos x - \sin x$

---

011 10.0 points

Determine $f^{(3)}(x)$ when

$$f(x) \;=\; 2\sin x + 3\cos x\,.$$

1. $f^{(3)}(x) \;=\; 3\sin x + 2\cos x$

2. $f^{(3)}(x) \;=\; -2\sin x - 3\cos x$

3. $f^{(3)}(x) \;=\; -2\cos x - 3\sin x$

4. $f^{(3)}(x) \;=\; -2\sin x + 3\cos x$

5. $f^{(3)}(x) \;=\; -2\cos x + 3\sin x$

6. $f^{(3)}(x) \;=\; -3\cos x + 2\sin x$

---

012 10.0 points

Find the derivative of

$$f(x) \;=\; \frac{\sin x - \cos x}{x^3}\,.$$

1. $f'(x) \;=\; \dfrac{(x+3)\cos x + (x-3)\sin x}{x^4}$

2. $f'(x) \;=\; \dfrac{(2-x)\sin x - (x+2)\cos x}{x^3}$

3. $f'(x) \;=\; \dfrac{(x-2)\sin x - (x+2)\cos x}{x^3}$

4. $f'(x) \;=\; \dfrac{(x+2)\cos x + (x-2)\sin x}{x^3}$

5. $f'(x) \;=\; \dfrac{(3-x)\sin x - (x+3)\cos x}{x^4}$

6. $f'(x) \;=\; \dfrac{(x-3)\cos x - (x+3)\sin x}{x^4}$

---

013 10.0 points

Find the derivative of f when

$$f(x) \;=\; 5x\cos 7x\,.$$

1. $f'(x) \;=\; 35\cos 7x + 7x\sin 7x$

2. $f'(x) \;=\; 5\cos 7x + 35x\sin 5x$

3. $f'(x) \;=\; 5\cos 5x - 5x\sin 7x$

4. $f'(x) \;=\; 5\cos 7x - 35x\sin 7x$

5. $f'(x) \;=\; 35\cos 7x - 5x\sin 7x$

---

014 10.0 points

Find $f'(x)$ when

$$f(x) \;=\; \Big(\frac{x-2}{x+1}\Big)^2\,.$$

1. $f'(x) \;=\; -\dfrac{6(x+2)}{(x-1)^3}$

2. $f'(x) \;=\; \dfrac{6(x-2)}{(x+1)^3}$

3. $f'(x) \;=\; -\dfrac{4(x+1)}{(x-1)^3}$

4. $f'(x) \;=\; \dfrac{4(x-1)}{(x+1)^3}$

5. $f'(x) = \dfrac{6(x+1)}{(x-1)^3}$

6. $f'(x) = -\dfrac{4(x-2)}{(x+1)^3}$

---

015 10.0 points

Find $f'(x)$ when

$$f(x) = \sqrt{x^2-4x}\,.$$

1. $f'(x) = (x-2)\sqrt{x^2-4x}$

2. $f'(x) = \dfrac{1}{2}(x-2)\sqrt{x^2-4x}$

3. $f'(x) = \dfrac{x-2}{2\sqrt{x^2-4x}}$

4. $f'(x) = \dfrac{x-2}{\sqrt{x^2-4x}}$

5. $f'(x) = 2(x-2)\sqrt{x^2-4x}$

6. $f'(x) = \dfrac{2(x-2)}{\sqrt{x^2-4x}}$

---

016 10.0 points

Determine the derivative of

$$f(x) = \frac{x-3}{\sqrt{x+1}}\,.$$

1. $f'(x) = \dfrac{x-1}{2(x+1)^{1/2}}$

2. $f'(x) = \dfrac{x-1}{(x+1)^{1/2}}$

3. $f'(x) = \dfrac{x-1}{(x+1)^{3/2}}$

4. $f'(x) = \dfrac{x+5}{2(x+1)^{3/2}}$

5. $f'(x) = \dfrac{x+5}{(x+1)^{3/2}}$

6. $f'(x) = \dfrac{x+5}{2(x+1)^{1/2}}$

---

017 10.0 points

Find the first derivative of f when

$$f(x) = 3\cos(2x) - \sin^2(x)\,.$$

1. $f'(x) = 7\sin(2x)$

2. $f'(x) = -7\sin(2x)$

3. $f'(x) = -14\cos(2x)$

4. $f'(x) = 14\sin(2x)$

5. $f'(x) = -14\sin(2x)$

6. $f'(x) = -7\cos(2x)$

---

018 10.0 points

Find the derivative of f when

$$f(x) = \left(x^{9/2} + 4x^{-9/2}\right)^2\,.$$

1. $f'(x) = 10\left(\dfrac{1-4\,x^{-18}}{x^9}\right)$

2. $f'(x) = 9\left(\dfrac{x^{18}-4}{x^9}\right)$

3. $f'(x) = 9\left(\dfrac{x^9+4}{x^9}\right)$

4. $f'(x) = 10\left(\dfrac{1+4\,x^{-18}}{x^9}\right)$

5. $f'(x) = 10\left(\dfrac{x^{18}+16}{x^{10}}\right)$

6. $f'(x) = 9\left(\dfrac{x^{18}-16}{x^{10}}\right)$

---

019 10.0 points

Find the x- and y-intercepts of the tangent line to the graph of

$$y = (\,3x+1\,)^{1/2}$$

at the point (1, 2).

1. x-intercept $= -\dfrac{4}{3}$, y-intercept $= \dfrac{3}{2}$

2. x-intercept $= -\dfrac{5}{4}$, y-intercept $= \dfrac{5}{4}$

3. x-intercept $= -\dfrac{2}{3}$, y-intercept $= \dfrac{1}{2}$

4. x-intercept $= -\dfrac{1}{3}$, y-intercept $= \dfrac{1}{4}$

5. x-intercept $= -\dfrac{5}{3}$, y-intercept $= \dfrac{5}{4}$

---

020 10.0 points

Determine $f'(x)$ when

$$f(x) = x^{2/3}(x-1)^{1/3}.$$

1. $f'(x) = \dfrac{3x-1}{3x^{2/3}(x-1)^{1/3}}$

2. $f'(x) = \dfrac{3x-2}{3x^{2/3}(x-1)^{1/3}}$

3. $f'(x) = \dfrac{3x+1}{3x^{2/3}(x-1)^{1/3}}$

4. $f'(x) = \dfrac{x+2}{3x^{1/3}(x-1)^{2/3}}$

5. $f'(x) = \dfrac{x-1}{3x^{1/3}(x-1)^{2/3}}$

6. $f'(x) = \dfrac{3x-2}{3x^{1/3}(x-1)^{2/3}}$

---

021 10.0 points

Find $f'(x)$ when

$$f(x) = x^{1/3}(x+3)^{2/3}.$$

1. $f'(x) = \dfrac{x+1}{x^{2/3}(x+3)^{1/3}}$

2. $f'(x) = \dfrac{3x+1}{x^{2/3}(x+3)^{1/3}}$

3. $f'(x) = \dfrac{x+3}{x^{1/3}(x+3)^{2/3}}$

4. $f'(x) = \dfrac{x+1}{x^{1/3}(x+3)^{2/3}}$

5. $f'(x) = \dfrac{x-1}{x^{2/3}(x+3)^{1/3}}$

6. $f'(x) = \dfrac{3x-1}{x^{1/3}(x+3)^{2/3}}$

---

022 10.0 points

Find the derivative of f when

$$f(x) = \frac{(2+x^2)^{1/2}}{x+5}.$$

1. $f'(x) = \dfrac{5x-2}{(x+5)(2+x^2)^{1/2}}$

2. $f'(x) = \dfrac{(5x-2)(2+x^2)^{1/2}}{(x+5)^2}$

3. $f'(x) = \dfrac{5x-2}{(x+5)^2(2+x^2)^{1/2}}$

4. $f'(x) = \dfrac{1-10x}{(x+5)^2(2+x^2)^{1/2}}$

5. $f'(x) = \dfrac{x-10}{(x+5)^2(2+x^2)^{1/2}}$

---

023 10.0 points

Find the derivative of f when

$$f(x) = \frac{(2x+1)^5}{(5x+1)^2}.$$

1. $f'(x) = \dfrac{30x(2x+1)^4}{(5x+1)^3}$

2. $f'(x) = \dfrac{x(2x+1)^4}{(5x+1)^3}$

3. $f'(x) = \dfrac{5x(2x+1)^4}{(5x+1)^2}$

4. $f'(x) = \dfrac{30(2x+1)^4}{(5x+1)^2}$

5. $f'(x) \;=\; \dfrac{5(2x+1)^4}{(5x+1)^3}$

6. $f'(x) \;=\; \dfrac{(2x+1)^4}{(5x+1)^2}$

---

024 10.0 points

Find the equation of the tangent line to the graph of

$$f(x) \;=\; (6x+2)^{\frac{1}{3}}$$

at the point $P = (1,\, f(1))$ on the graph of f.

1. $y \;=\; \dfrac{1}{2}x + 19$

2. $y \;=\; 6x + 19$

3. $y \;=\; 6x + \dfrac{3}{2}$

4. $y + \dfrac{1}{2}x \;=\; \dfrac{3}{2}$

5. $y \;=\; \dfrac{1}{2}x + \dfrac{3}{2}$

6. $y + 6x \;=\; 19$

---

025 10.0 points

Find $f'(x)$ when

$$f(x) \;=\; \frac{\sqrt{5-x^2}}{x}\,.$$

1. $f'(x) \;=\; \dfrac{1}{x\sqrt{5-x^2}}$

2. $f'(x) \;=\; -\dfrac{1}{x\sqrt{5-x^2}}$

3. $f'(x) \;=\; -\dfrac{5}{x^2\sqrt{5-x^2}}$

4. $f'(x) \;=\; -\dfrac{1}{x^2\sqrt{5-x^2}}$

5. $f'(x) \;=\; \dfrac{5}{x^2\sqrt{5-x^2}}$

---

026 10.0 points

Find the value of $F'(4)$ when

$$F(x) \;=\; f(g(x))$$

and

$$g(4) \;=\; 2, \qquad g'(4) \;=\; 6\,,$$
$$f'(4) \;=\; 4, \qquad f'(2) \;=\; 3\,.$$

1. $F'(4) \;=\; 15$

2. $F'(4) \;=\; 18$

3. $F'(4) \;=\; 14$

4. $F'(4) \;=\; 17$

5. $F'(4) \;=\; 16$

---

027 10.0 points

Find the second derivative of f when

$$f(x) \;=\; 3\cos 2x - \sin^2 x\,.$$

1. $f''(x) \;=\; 7\cos 2x$

2. $f''(x) \;=\; 14\cos 2x$

3. $f''(x) \;=\; -14\cos 2x$

4. $f''(x) \;=\; -7\sin 2x$

5. $f''(x) \;=\; -14\sin 2x$

6. $f''(x) \;=\; -7\cos 2x$

---

028 10.0 points

Find the value of $f'(0)$ when

$$f(x) = \frac{1}{4}e^{4x} + \frac{1}{4}e^{-x}\,.$$

1. $f'(0) = \dfrac{15}{16}$

2. $f'(0) = \dfrac{13}{16}$

3. $f'(0) = \dfrac{3}{4}$

4. $f'(0) = \dfrac{7}{8}$

5. $f'(0) = \dfrac{9}{16}$

---

029 10.0 points

Find the derivative of

$$f(x) \;=\; (x^2 + 5x - 2)e^{-x}\,.$$

1. $f'(x) \;=\; (2 - 5x + x^2)e^{-x}$

2. $f'(x) \;=\; (7 - 5x - x^2)e^{-x}$

3. $f'(x) \;=\; (7 - 5x + x^2)e^{-x}$

4. $f'(x) \;=\; (2 - 3x + x^2)e^{-x}$

5. $f'(x) \;=\; (7 - 3x - x^2)e^{-x}$

6. $f'(x) \;=\; (2 - 3x - x^2)e^{-x}$

---

030 10.0 points

Find y' when

$$xy + 3x + 2x^2 \;=\; 3\,.$$

1. $y' \;=\; \dfrac{y + 3 + 2x}{x}$

2. $y' \;=\; \dfrac{3 + 2x - y}{x}$

3. $y' \;=\; -\dfrac{y + 3 + 2x}{x}$

4. $y' \;=\; -(y + 3 + 4x)$

5. $y' \;=\; -\dfrac{y + 3 + 4x}{x}$

6. $y' \;=\; \dfrac{y + 3 + 4x}{x}$

---

031 10.0 points

Find dy/dx when

$$3x^2 + 2y^2 \;=\; 5\,.$$

1. $\dfrac{dy}{dx} \;=\; -\dfrac{3x}{y}$

2. $\dfrac{dy}{dx} \;=\; -3xy$

3. $\dfrac{dy}{dx} \;=\; 2xy$

4. $\dfrac{dy}{dx} \;=\; \dfrac{3x}{2y}$

5. $\dfrac{dy}{dx} \;=\; \dfrac{x}{2y}$

6. $\dfrac{dy}{dx} \;=\; -\dfrac{3x}{2y}$

---

032 10.0 points

If y is defined implicitly by

$$5y^2 - xy - 24 \;=\; 0\,,$$

find the value of dy/dx at (26, 6).

1. $\left.\dfrac{dy}{dx}\right|_{(26,6)} = \dfrac{7}{34}$

2. $\left.\dfrac{dy}{dx}\right|_{(26,6)} = \dfrac{3}{17}$

3. $\left.\dfrac{dy}{dx}\right|_{(26,6)} = -\dfrac{7}{34}$

4. $\left.\dfrac{dy}{dx}\right|_{(26,6)} = -\dfrac{3}{17}$

5. $\left.\dfrac{dy}{dx}\right|_{(26,6)} = \dfrac{6}{35}$

---

033 10.0 points

If $y = y(x)$ is defined implicitly by

$$2y^2 + xy - 1 \;=\; 0,$$

find the value of dy/dx at the point $(1, -1)$.

1. $\left.\frac{dy}{dx}\right|_{(1,-1)} = 1$

2. $\left.\frac{dy}{dx}\right|_{(1,-1)} = -1$

3. $\left.\frac{dy}{dx}\right|_{(1,-1)} = \frac{1}{3}$

4. $\left.\frac{dy}{dx}\right|_{(1,-1)} = -\frac{2}{3}$

5. $\left.\frac{dy}{dx}\right|_{(1,-1)} = \frac{2}{3}$

6. $\left.\frac{dy}{dx}\right|_{(1,-1)} = -\frac{1}{3}$

---

034 10.0 points

Determine dy/dx when

$$5 \cos x \sin y = 7 .$$

1. $\frac{dy}{dx} = \tan xy$

2. $\frac{dy}{dx} = \tan x \tan y$

3. $\frac{dy}{dx} = \tan x$

4. $\frac{dy}{dx} = \cot x \cot y$

5. $\frac{dy}{dx} = \cot x \tan y$

---

035 10.0 points

Find the equation of the tangent line to the graph of

$$4y^2 - xy - 9 = 0,$$

at the point $P = (9, 3)$.

1. $14y + 3x = 15$

2. $3y = x$

3. $5y + x = 6$

4. $5y = x + 6$

5. $14y = 3x + 15$

---

036 10.0 points

Find an equation for the tangent line to the curve

$$2x^2 + xy + 2y^2 = 5$$

at the point $(1, 1)$.

1. $y = -x + 2$

2. $y = x + 5$

3. $y = 7x + 2$

4. $y = -7x + 2$

5. $y = 3x - 4$

6. $y = -3x + 2$