Worksheet on Derivatives

Find the derivative

1. $y = 5x - 1$

2. $y = -4x^{10}$

3. $y = \frac{4}{3}\pi r^3$

4. $y = \left(\frac{s}{2}\right)^5$

5. $y = 5t^{\frac{-3}{5}}$

6. $y = \sqrt{x} - \frac{1}{\sqrt{x}}$

7. $y = x^2 + \frac{1}{x^2}$

8. $y = \left(x^3 - x + 1\right)\left(x^{-2} + 2x^{-3}\right)$

9. $y = \sqrt[3]{x}\left(x + 2\right)$

10. $y = \frac{x+2}{x-1}$

11. $y = \frac{x^2 + 4x + 3}{\sqrt{x}}$

12. $y = \frac{1}{x^4 + x^2 + 1}$

13. $y = x\sqrt{x} + \frac{1}{x^2\sqrt{x}}$

14. $y = \frac{3x - 7}{x^2 + 5x - 4}$

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15. $y = x - 3\sin x$

16. $y = \sin x + \cos x$

17. $y = x^3 \cos x$

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17. $y = x^3 \cos x$

18. $y = \theta \csc\theta - \cot\theta$

19. $y = \dfrac{\tan x}{x}$

20. $y = \dfrac{x}{\sin x + \cos x}$

21. $y = \dfrac{\sin x}{x^2}$

22. $y = \csc x \cot x$

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23. $y = (x^2 + 4x + 6)^5$

24. $y = \tan(3x)$

25. $y = \cos(\tan x)$

26. $y = \sqrt[3]{1 + x^3}$

27. $y = \sqrt{\sin x}$

28. $y = \sin(\sqrt{x})$

29. $y = \dfrac{1}{\left(x^2 - 2x - 5\right)^4}$

30. $y = 4\sec 5x$

31. $y = \left(\dfrac{x-6}{x+7}\right)^2$

32. $y = \sec^2 2x - \tan^2 2x$

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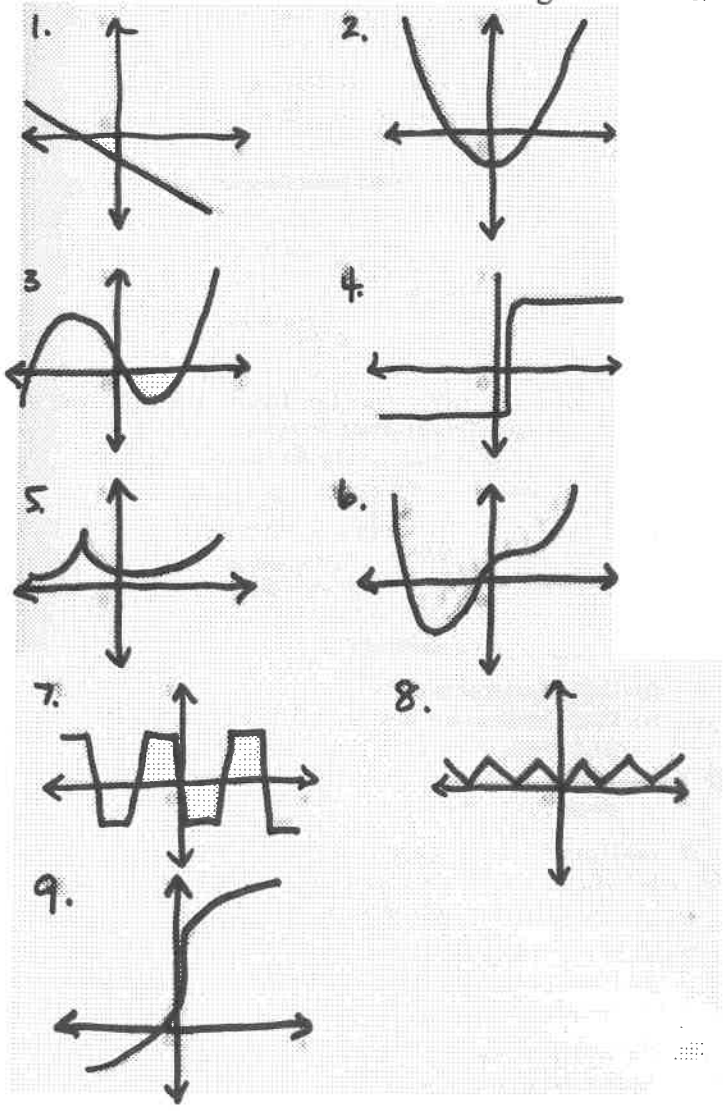
33. Find the equation of the tangent line to $y = 5x^2 - 4x + 7$ at the point $(1,8)$

34. Find the equation of the tangent line to $y = x + \cos x$ at the point $(0,1)$

35. A particle moves according to a law of motion $s = f(t) = t^3 - 12t^2 + 36t$ for $t \geq 0$, where t is measured in seconds and s is in feet.

a. Find the velocity at time t
b. What is the velocity after 3 sec?
c. When is the particle at rest?
d. When is the particle moving in the positive direction?
e. Find the total distance traveled in the first 8 secs.

36. Sketch the derivatives of the following 9 functions.



37.

- Estimate $f'(2.5)$ given the following table of values:

| $x$ | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 |
|---|---|---|---|---|---|
| $f(x)$ | 2 | 2.1 | 3 | 4 | 4.2 |

38.

Estimate $g'(4)$ given the following table of values:

| $x$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| $g(x)$ | .5 | .6 | .8 | 1 | 1.4 | 1.5 | 2 |

39.

$$g(x)=\begin{cases}8x-3, & x\le 1\\ 4x^2+5, & x>1\end{cases}$$

Is $g(x)$ continuous AND differentiable at $x=1$?

40.

Is $h(x)$ continuous and differentiable at $x=3$?

$$h(x)=\begin{cases}x^2-4x+8, & x\le 3\\ 2x-1, & x>3\end{cases}$$