MATH-1150 (DUPRÉ) FALL 2011 PRACTICE TEST 2

FIRST: PRINT YOUR LAST NAME IN LARGE CAPITAL LETTERS ON THE UPPER RIGHT CORNER OF EACH SHEET TURNED IN.

SECOND: PRINT YOUR FIRST NAME IN CAPITAL LETTERS DIRECTLY UNDERNEATH YOUR LAST NAME ON EACH SHEET TURNED IN.

THIRD: WRITE YOUR SPRING 2011 MATH-1150 SECTION NUMBER DIRECTLY UNDERNEATH YOU FIRST NAME ON EACH SHEET TURNED IN.

FOURTH: Write NEATLY and CLEARLY, putting your answers in the space provided. If I cannot read it you do not get credit.

1. If the line L in the plane with rectangular coordinates has slope 3 and passes through the point $(5, 4)$, then what is the equation of L?

2. If the line L in the plane passes through the points $(2, 4)$ and $(5, 10)$, then what is the slope of L?

3. If the line L in the plane passes through the points $(2, 4)$ and $(5, 10)$, then what is the equation of L?

4. What is the distance from the point $(2, 4)$ to the point $(5, 8)$?

5. What is the equation of the circle in the rectangular coordinate plane with center at $(2, 4)$ having radius 3?

6. If a bee is flying along the line $y = 3(x-5)+4$ so that its $x-$coordinate increases at the rate of 2 cm/sec, then what is the rate of increase of its $y-$coordinate?

7. If the line $y = 3(x-5)+4$ is tangent to the curve C in the plane at the point $(5,4)$ and a bee is flying along C and at the instant the bee passes $(5,4)$ its $x-$coordinate increases at the rate of 2 cm/sec, then what is the rate of increase of its $y-$coordinate at that same instant?

8. Suppose that an oil spill in the Gulf of Mexico has a boundary which is 200 miles long. The spill is partially contained but along one 20 mile length the spill breaks through the containment and the boundary moves outward at the rate of .07 miles/day, and along another 30 mile length the spill breaks through its containment and there the boundary moves outward at the rate of .04 miles/day. What is the total rate of increase of area of the oil spill due to these containment breaks in square miles per day?

9. Suppose that f is the function whose value at x is given by $f(x) = \sqrt{4-x^2}$. What is the domain of f?

10. If $f(x) = \sqrt{4-x^2}$ and $g(x) = \sqrt{3+x^2}$, and if $h = f \circ g$, then what is $h(x)$?

11. If $f(x) = \sqrt{4-x^2}$ and $g(x) = \sqrt{3+x^2}$, and if $h = g \circ f$, then what is $h(x)$?

12. If $f(x) = 1+x^2$ with domain $\{x \in \mathbb{R} : x \geq 0\}$, and if g is the inverse function to f, then what is $g(x)$?

13. If f and g are functions with
$f(2) = 5,\ f(3) = 7,\ f(5) = 4,\ f(7) = 2,\ g(2) = 4,\ g(3) = 2,\ g(5) = 7,\ g(7) = 4$, and if $h = g \circ f$, then what are
$(f+g)(3),\ h(3),\ (f \cdot g)(2)$, and $(f \cdot h)(3)$?

14. If lines L and M are parallel to each other and if L has slope 3, then what is the slope of M?

15. If line L is parallel to the line with equation $y = 7 - 4x$ and if $(2, 3)$ is a point on line L, then what is the equation of L?

16. If lines L and M are perpendicular to each other and if L has slope 3, then what is the slope of M?

17. If line L is perpendicular to the line with equation $y = 7 - 4x$ and if $(2, 3)$ is a point on line L, then what is the equation of L?

18. If $f(x) = x^2 + 3x + 2$ what is the average rate of change of f from $x = 0$ to $x = 2$.?

19. If $f(x) = x^2 + 3x + 2$, then what is the slope of the line through the two points on the graph of f where $x = 0$ and $x = 2$?

20. If $f(x) = x^2 + 3x + 2$, then what is the equation of the line through the two points on the graph of f where $x = 0$ and $x = 2$?

21. If $f(x) = x^2 + 3x + 2$ and if a and b are two real numbers, then what is the slope of the line through the two points on the graph of f where $x = a$ and $x = b$.?

22. If $f(x) = x^2 + 3x + 2$, what is $f(x + a)$?

23. If $f(x) = x^2 + 3x + 2$, what is $f(x + b)$?

24. If $f(x) = x^2 + 3x + 2$, what is $f(x + b) - f(x)$?

25. If $f(x) = x^2 + 3x + 2$, what is $\dfrac{f(x + a) - f(x)}{a}$? What are the values when $x = 2$ and $a = .01,\ .001,\ .0001$?

26. If $f(x) = x^{3.4}$ what is $f'(x)$?

27. If $f(x) = (1/2)x^2$, what is the slope of the tangent line to the graph of f where $x = 3$?

28. If $f(x) = (1/2)x^2$, what is the equation of the tangent line to the graph of f where $x = 3$?

29. If $f(x) = (1/2)x^2$, what is the derivative of f?

29. If $f(x) = (1/2)x^2$, and $y = f(x)$ what is dy/dx?

Calculate the limits in the following problems.

30. $\lim_{x\to 2} \dfrac{x^2+4}{x^3+2}$

31. $\lim_{x\to 2} \dfrac{x^2-4}{x-2}$

32. $\lim_{x\to 2} \dfrac{x^2-4}{x^2+2x-8}$

33. $\lim_{x\to 2} \dfrac{x^2+4x-12}{x^2+2x-8}$

34. $\lim_{x\to 2} \dfrac{x^2-4}{x^3-8}$

35. $\lim_{x\to 2^+} \dfrac{x^2+4}{x-2}$

36. $\lim_{x\to 2^-} \dfrac{x^2+4}{x-2}$

37. $\lim_{x\to 2} \dfrac{x^2+4}{(x-2)(x-3)}$

38. $\lim_{x\to 2^+} \dfrac{x^2+4}{(x-2)(x-3)}$

39. $\lim_{x\to 2^-} \dfrac{x^2+4}{(x-2)(x-3)}$

40. $\lim_{x\to\infty} \dfrac{7x^2+4}{(4x-2)(5x-3)}$

41. $\lim_{x\to-\infty} \dfrac{7x^2+4}{(4x-2)(5x-3)}$

Differentiate the given functions.

42. $f(x) = (7x^2+4)(4x-2)(5x-3)$

43. $f(x) = \dfrac{7x^2+4}{(4x-2)(5x-3)}$

44. $f(x) = \sqrt{7x^3-4x^2+3}$

45. $f(x) = (7x^2+4)^{99}$

46. $f(x) = \dfrac{(7x^2+4)^{99}}{(4x-2)(5x-3)}$

Suppose that f and g are functions, and that

$$f(2)=5,\ f'(2)=4,\ g(2)=3,\ g'(2)=7,\ g(5)=9,\ \textbf{and}\ g'(5)=11.$$

Calculate the given limits and derivatives.

47. $h'(2)$ where $h = f - g$.

48. $h'(2)$ where $h = f \cdot g$.

49. $h'(2)$ where $h = f/g$.

50. $h'(2)$ where $h = g \circ f$.

51. $\lim_{x \to 2} \dfrac{f(x) - 5}{x - 2}$

52. $\lim_{x \to 2} \dfrac{f(x) - 5}{g(x) - 3}$

53. $\lim_{x \to 2} f(x)$

54. $\lim_{x \to 2} \dfrac{g(f((x)) - 9}{x - 2}$

55. $\lim_{x \to 2} \dfrac{f(x)g(x) - 15}{x - 2}$