Circle the correct answer for problems 1-2. Place your answer for problem 3 in the space provided.

(6 pts) 1. Find the slope of the line through the points $(-4,1)$ and $(3,-2)$.

A. $\frac{7}{3}$

B. $-\frac{3}{7}$

C. $\frac{3}{7}$

D. $-\frac{7}{3}$

E. None of the above

(6 pts) 2. Find the domain of the function $h(x)\frac{x+5}{(x-4)\left(\sqrt{2x+6}\right)}$. Express your answer in interval notation.

A. $(-\infty,3)\cup(3,\infty)$

B. $(-\infty,-3)\cup(-3,4)\cup(4,\infty)$

C. $(-\infty,4)\cup(4,\infty)$

D. $(-3,4)\cup(4,\infty)$

E. $(-3,\infty)$

(6 pts) 3. Given the functions $f(x)=x^2-2x$ and $g(x)=3-x$, find and simplify $(f\circ g)(x)$.

Place your answers in the spaces provided. You must show your work to receive credit.

(6 pts) 4. A retailer can sell quilts for \$80 apiece. The total cost to manufacture the quilts consists of a fixed overhead of \$7000 plus production costs of \$45 per quilt. If x represents the number of quilts produced and sold, find the profit function, $P(x)$.

$P(x) =$ ____

(10 pts) 5. Simplify completely.

$$\frac{(5)(x^2+1)^4(2x)(3x+2)^4-(4)(3x+2)^3(3)(x^2+1)^5}{(3x+2)^8}$$

____

(10 pts) 6. A closed rectangular box with a square base is to have volume of 325 cubic meters. The material for the top costs \$3 per square meter, material for the bottom costs \$4 per square meter, and the material for the sides costs \$2 per square meter. Express the cost, C, of the construction of the box as a function of the length of its base, x. Simplify your answer.

$C(x)=$ ____

Place your answers in the spaces provided. You must show your work to receive any credit.

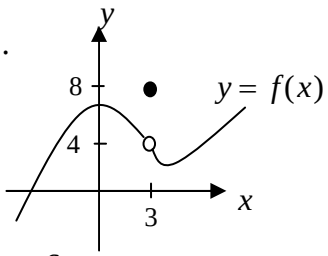
(10 pts) 7. Given the function $f(x)=\begin{cases}\dfrac{x^2-25}{x+5} & \text{if } x<3\\ 7-3x & \text{if } x\geq 3\end{cases}$, find all value(s) of x for which the function is continuous. Justify your answer(s) using all the tests for continuity for full credit. Express your answer in interval notation.

8. Find the indicated limit, if it exists. If it does not exist, write DNE.

(4 pts) (a) $\lim\limits_{x\to 3}\dfrac{x^2+4x+4}{x^2-2x-3}$

(4 pts) (b) $\lim\limits_{x\to 5}\dfrac{x^2-25}{x^2-3x-10}$

(2 pts) (c) $\lim\limits_{x\to 3} f(x)$.



(4 pts) (d) $\lim\limits_{x\to\infty}\dfrac{3x^2+x-6}{x^4+1}$

Place your answers in the spaces provided. You must show your work to receive credit.

9. Let $f(x) = 3x^2 - 1$. Answer each of the following:

(10 pts) (a) Use the definition of the derivative to show that $f'(x) = 6x$.

(8 pts) (b) Find the equation of the tangent line to the graph of f at the point $(2,11)$. Leave your answer in slope-intercept form.

$y =$ ____

(8 pts) 10. Find the derivative, $f'(x)$ of the following function:

$$f(x) = 3x^{\frac{2}{3}} + \frac{3}{x^3} - x^2 + 2$$

$f'(x) =$ [ ]

(6 pts) 11. An efficiency study conducted for VanTuinen Industries showed the number of units assembled by the average worker t hours after 8 a.m. is given by

$$N(t) = -2t^3 + 5t^2 + 19t$$

Find the rate the average worker will assemble units at 10 a.m.

[ ]

ANSWERS

1. B

2. D

3. $x^2 - 4x + 3$

4. $P(x) = 35x - 7000$

5. $\dfrac{2(x^2+1)^4(9x^2+10x-6)}{(3x+2)^5}$

6. $C(x) = 7x^2 + \dfrac{2600}{x}$

7. $(-\infty, -5) \cup (-5, \infty)$

8. (a) DNE
   (b) $\dfrac{10}{7}$
   (c) 4
   (d) 0

9. (a) Uses $\lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

   (b) $y = 12x - 13$

10. $f'(x) = \dfrac{2}{x^{\frac{1}{3}}} - \dfrac{9}{x^4} - 2x$

11. 15 units/hr.