EXAM 1 - MATH 112 Friday, September 17

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Find the slope of the line ℓ that is parallel to the line ℓ' passing through the points $(-7, 15)$ and $(3, -5)$.

   (b) Find an equation for the line ℓ which passes through $(-2, 9)$ and is perpendicular to the line ℓ' that passes through the points $(-1, 3)$ and $(7, 1)$.

2. City Gadgets has fixed costs \$7,000 while each gadget they produce costs \$40. If they produce and sell x gadgets, then their revenue is $R(x) = -x^2 + 210x$ dollars.

   (a) Find an equation for the cost function $C(x)$.

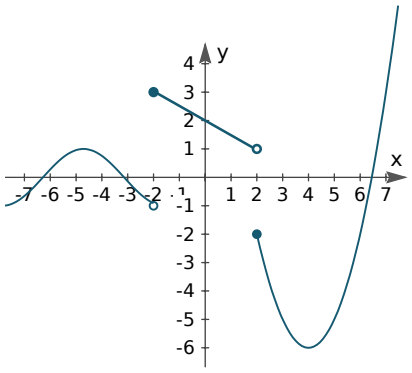
   (b) Find the break-even point(s) for City Gadgets.

   (c) How many gadgets does the company have to produce to maximize its profit?

3. (a) Find the domain of $f(x) = \dfrac{x+3}{2x^3 - 13x^2 - 7x}$.

(b) Calculate the difference quotient of $f(x) = x^2 - 2x$ at $x = 3$ and simplify.

4. Consider the function $y = f(x)$ whose graph is shown below. Answer all questions on the left and check (✓) the appropriate blank squares of the table on the right.



$f(2) =$

$\lim_{x \to 2^-} f(x) =$

$\lim_{x \to 2^+} f(x) =$

$\lim_{x \to 2} f(x) =$

Statement	True	False
f is left continuous at $x = 2$		
f is right continuous at $x = 2$		
f is continuous at $x = 2$		

5. Consider the function

$$f(x) = \begin{cases} \dfrac{x-4}{x^2-10x+24}, & \text{if } x < 4 \\ -\frac{1}{2}, & \text{if } x = 4 \\ \dfrac{\sqrt{x-3}-1}{x-4}, & \text{if } x > 4 \end{cases}$$

Answer all questions, **showing all your work**.

(a) $f(4) =$

(b) $\lim_{x \to 4^-} f(x) =$

(c) $\lim_{x \to 4^+} f(x) =$

(d) $\lim_{x \to 4} f(x) =$

(e) Check (✓) the appropriate blank squares in the table.

Statement	True	False
f is left continuous at $x = 4$		
f is right continuous at $x = 4$		
f is continuous at $x = 4$		