5.6 Determining Concavity

Calculus

Name: _____

Find the point(s) of inflection for each function. Justify your answer.

1. $g(x) = -x^3 + x^2 - 4$

2. $g(x) = 2\cos x + x$ on the interval $(0, 2\pi)$

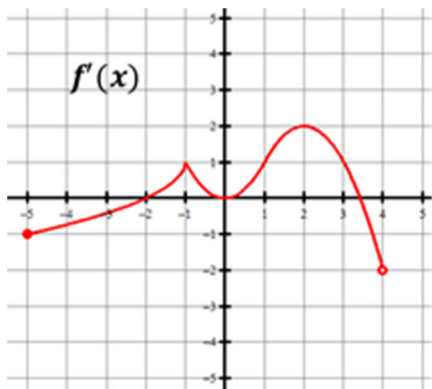3. $f(x) = xe^x$

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

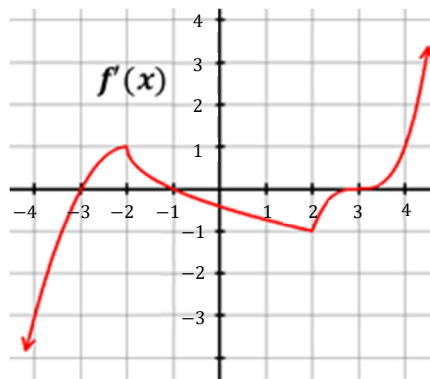**State the intervals of concavity.**

5. $f(t) = t^3 - 12t^2 + 45t + 7$

6. $g(x) = \frac{x}{x+2}$

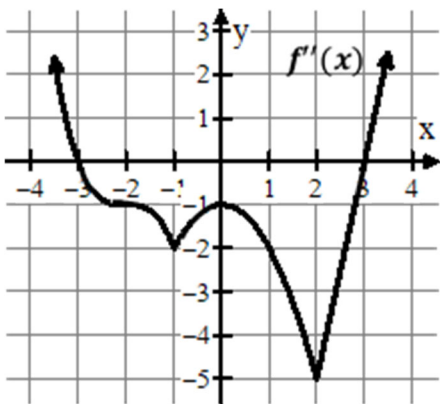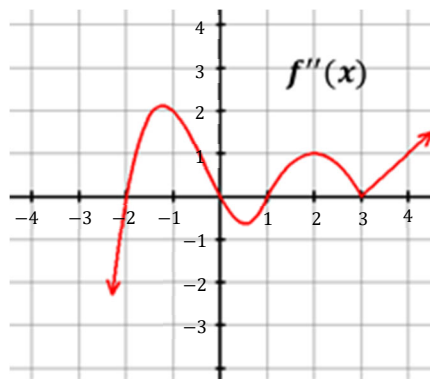## The graph of $f'(x)$ is shown. Find the point(s) of inflection.

7.

$f'(x)$

8.

$f'(x)$

The graph of $f''(x)$ is shown. State the intervals of concavity of $f(x)$ and find the point(s) of inflection.

9.

$f''(x)$

10.

$f''(x)$

Does the line tangent to the graph of h at the given value of x lie above or below the graph of h? Why?

11. $h(x) = e^x - x^3$ at $x = -2$

12. $h(x) = 5x^2 - 2x^3$ at $x = 1$

Answers to 5.6 CA #1

1. $x = \frac{1}{3}$ because $g''(x)$ changes sign.	2. $x = \frac{\pi}{2}$ and $x = \frac{3\pi}{2}$ because $g''(x)$ changes sign.	3. $x = -2$ because $f''(x)$ changes sign.	4. No point of inflection because $f''(x)$ sign does not change.
5. Concave down: $(-\infty, 4)$ Concave up: $(4, \infty)$	6. Concave up: $(-2, \infty)$ Concave down: $(-\infty, -2)$	7. $x = -1, 0, 2$	8. $x = -2, 2$
9. pts of inflection at $x = -3, 3$ Concave up: $(-\infty, -3)$ and $(3, \infty)$ Concave down: $(-3, 3)$	10. pts of inflection at $x = -2, 0, 1$ Concave up: $(-2, 0)$ and $(1, \infty)$ Concave down: $(-\infty, -2)$ and $(0, 1)$	11. Below because $h''(-2) > 0$	12. Above because $h''(1) < 0$