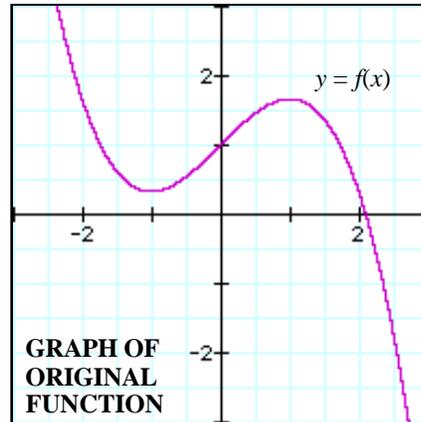


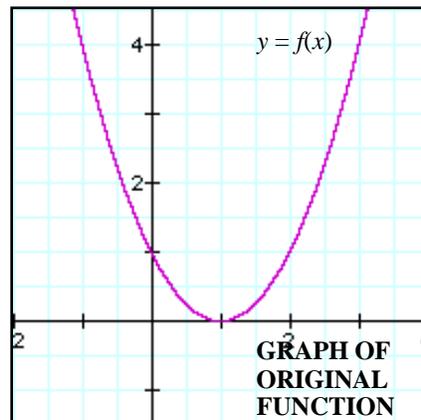
Problems for Gateway #2: The Derivative and Concavity

1. The graph shown below shows the **ORIGINAL FUNCTION** $y = f(x)$.



Over which intervals will the **DERIVATIVE** f' be increasing?

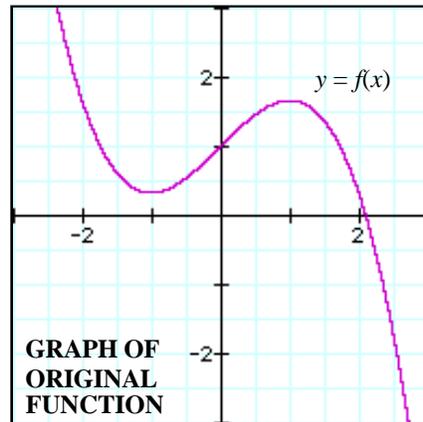
- (a) The interval $(-\infty, 0)$ only.
 - (b) The intervals $(-\infty, -1)$ and $(1, \infty)$ only.
 - (c) The interval $(-1, 1)$ only.
 - (d) The derivative is always negative and therefore never increases.
 - (e) The interval $(-2, 2)$ only.
2. The graph shown below shows the **ORIGINAL FUNCTION** $y = f(x)$.



Over which intervals will the **DERIVATIVE** f' be decreasing?

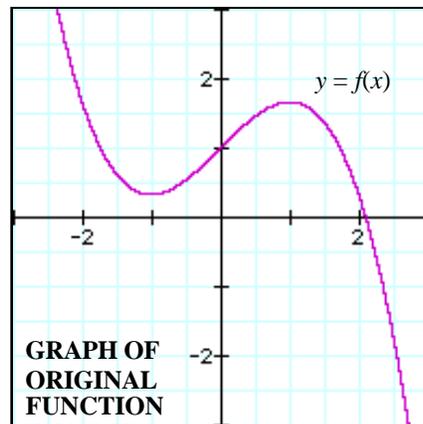
- (a) The interval $(-\infty, 0)$ only.
- (b) The derivative never decreases.
- (c) The interval $(0, +\infty)$ only.
- (d) The intervals $(-\infty, 1)$ only.
- (e) The interval $(1, \infty)$ only.

3. The graph shown below shows the **ORIGINAL FUNCTION** $y = f(x)$.



Over which intervals will the **DERIVATIVE** f' be increasing?

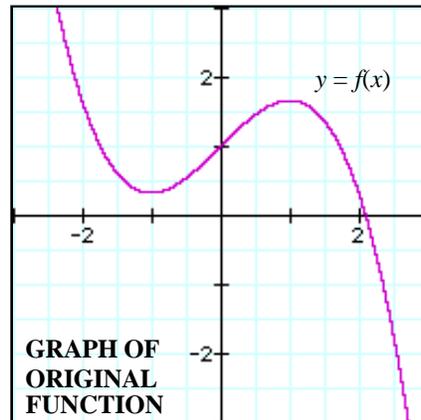
- (a) The interval $(-\infty, 0)$ only.
 - (b) The intervals $(-\infty, -1)$ and $(1, \infty)$ only.
 - (c) The interval $(-1, 1)$ only.
 - (d) The derivative is always negative and therefore never increases.
 - (e) The interval $(-2, 2)$ only.
4. The graph shown below shows the **ORIGINAL FUNCTION** $y = f(x)$.



Over which intervals will the **DERIVATIVE** f' be decreasing?

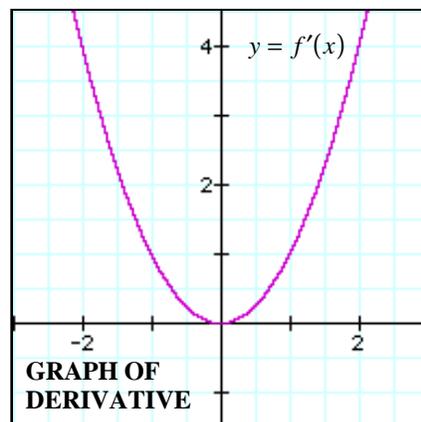
- (a) The interval $(-\infty, 0)$ only.
- (b) The intervals $(-\infty, -1)$ and $(1, \infty)$ only.
- (c) The interval $(-1, 1)$ only.
- (d) The derivative is always negative and therefore never increases.
- (e) The interval $(0, +\infty)$ only.

5. The graph shown below shows the **ORIGINAL FUNCTION** $y = f(x)$.



Over which intervals will the **DERIVATIVE** f' be increasing?

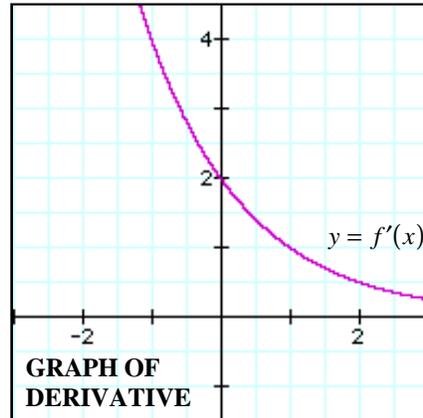
- (a) The interval $(-\infty, 0)$ only.
 - (b) The intervals $(-\infty, -1)$ and $(1, \infty)$ only.
 - (c) The interval $(-1, 1)$ only.
 - (d) The derivative is always negative and therefore never increases.
 - (e) The interval $(-2, 2)$ only.
6. The graph shown below shows the **DERIVATIVE** $y = f'(x)$.



Over which intervals will the **ORIGINAL FUNCTION** f be concave up?

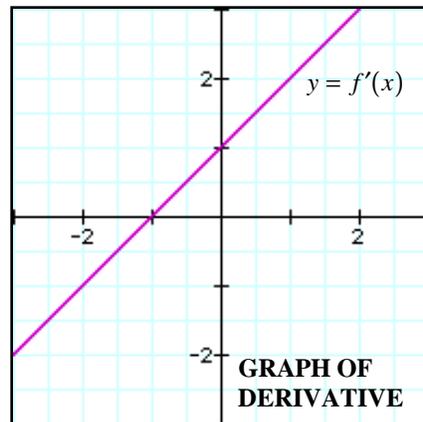
- (a) The interval $(-\infty, 0)$ only.
- (b) The intervals $(-\infty, -1)$ and $(1, \infty)$ only.
- (c) The original function is concave up at all real values of x .
- (d) The derivative is linear function that is neither concave up nor down.
- (e) The interval $(0, +\infty)$ only.

7. The graph shown below shows the **DERIVATIVE** $y = f'(x)$.



Over which intervals will the **ORIGINAL FUNCTION** f be concave down?

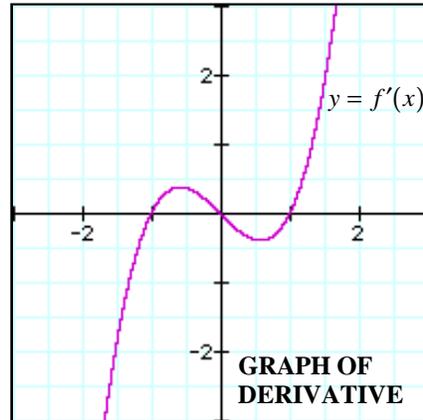
- (a) The interval $(-\infty, 0)$ only.
 - (b) The intervals $(-\infty, -1)$ and $(1, \infty)$ only.
 - (c) The original function is concave down for all real values of x .
 - (d) The original function cannot be concave down.
 - (e) The interval $(0, 2)$ only.
8. The graph shown below shows the **DERIVATIVE** $y = f'(x)$.



Over which intervals will the **ORIGINAL FUNCTION** f be concave up?

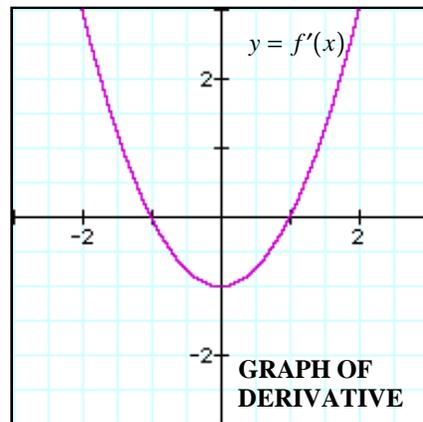
- (a) The interval $(-\infty, 0)$ only.
- (b) The original function is concave up at all real values of x .
- (c) The interval $(-1, 1)$ only.
- (d) The graph is linear which is neither concave up nor down.
- (e) The interval $(-1, +\infty)$ only.

9. The graph shown below shows the **DERIVATIVE** $y = f'(x)$.



Over which intervals will the **ORIGINAL FUNCTION** f be concave down?

- (a) The interval $(-0.5, 0.5)$ only.
 - (b) The intervals $(-\infty, -1)$ and $(1, \infty)$ only.
 - (c) The interval $(-1, 0)$ only.
 - (d) The intervals $(-\infty, -0.5)$ and $(0.5, \infty)$ only.
 - (e) The interval $(0, 1)$ only.
10. The graph shown below shows the **DERIVATIVE** $y = f'(x)$.



Over which intervals will the **ORIGINAL FUNCTION** f be concave up?

- (a) The interval $(-\infty, 0)$ only.
- (b) The intervals $(-\infty, 0)$ and $(0, +\infty)$ but not at $x = 0$.
- (c) The interval $(-1, 1)$ only.
- (d) The interval $(0, +\infty)$ only.
- (e) The intervals $(-\infty, -1)$ and $(1, +\infty)$ only.

ANSWERS:

- | | | | | | | | |
|----|---|-----|---|----|---|----|---|
| 1. | A | 2. | B | 3. | A | 4. | E |
| 5. | A | 6. | E | 7. | C | 8. | B |
| 9. | A | 10. | D | | | | |