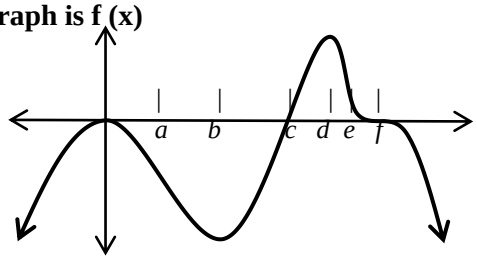
Using $f'(x)$ and $f''(x)$ WKST

Name:_____

No calculator is needed for these problems.
A calculator may only be used to verify your solutions.

Use the figure on the right to answer #1 to #8. The graph is f (x)



1. What are the critical values of $f(t)$?
   (A) b , d
   (B) 0 , b , d
   (C) 0 , b , d , f
   (D) 0 , c , f
   (E) 0 , c

2. When is $f(t)$ increasing?
   (A) (-∞ , 0) and (b , d)
   (B) (0 , b) and (d , +∞)
   (C) (-∞ , c) and (f , +∞)
   (D) (c , f)
   (E) (a , c) and (e , f)
   (F) (-∞ , a) , (c , e), and (f , +∞)

3. When is $f(t)$ decreasing?
   (A) (-∞ , 0) and (b , d)
   (B) (0 , b) and (d , +∞)
   (C) (-∞ , c) and (f , +∞)
   (D) (c , f)
   (E) (a , c) and (e , f)
   (F) (-∞ , a) , (c , e), and (f , +∞)

4. For each value of t below, classify $f(t)$ as a relative maximum, minimum, or neither.

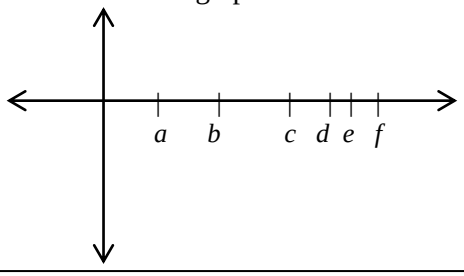
   0 _____ a _____ b _____ c _____
   d _____ e _____ f _____

5. What are the possible points of inflection of $f(t)$?
   (A) 0 , a, c
   (B) a, c
   (C) 0 , b, d
   (D) b, d
   (E) 0
   (F) 0 , b, d, f

6. When is $f(t)$ concaving up?
   (A) (-∞ , 0) and (b , d)
   (B) (0 , b) and (d , +∞)
   (C) (-∞ , c) and (f , +∞)
   (D) (c , f)
   (E) (a , c) and (e , f)
   (F) (-∞ , a) , (c , e), and (f , +∞)

7. When is $f(t)$ concaving down?
   (A) (-∞ , 0) and (b , d)
   (B) (0 , b) and (d , +∞)
   (C) (-∞ , c) and (f , +∞)
   (D) (c , f)
   (E) (a , c) and (e , f)
   (F) (-∞ , a) , (c , e), and (f , +∞)

8. Sketch a graph of the derivative of $f(t)$.

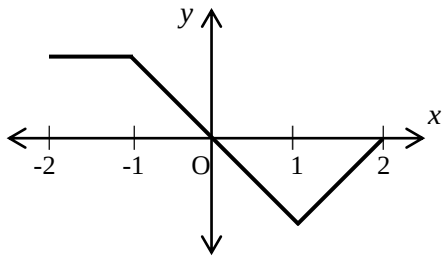


9. On what interval is $f(x) = x^3 + x$ concave up? THINK: When is the second derivative positive?
   (A) ($-\infty$, $+\infty$)
   (B) (0 , $+\infty$)
   (C) ($-\infty$, 0)
   (D) (0 , 1)
   (E) (-1 , 0)

10. The absolute maximum of $f(x) = \dfrac{x}{x^2+1}$ is THINK: What are the critical values and what is the actual point of the max? (The y-value of the max.)
   (A) 0
   (B) .25
   (C) .5
   (D) .75
   (E) 1

11. On what interval(s) is the graph of $f(x) = \dfrac{x}{x^2+1}$ concave down?

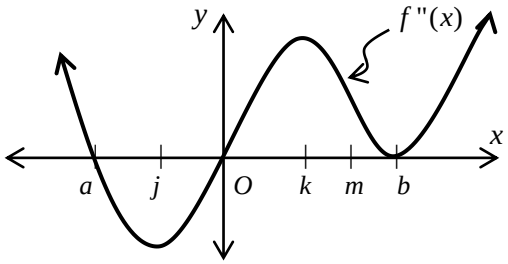
(A) $(0, \sqrt{3})$
(B) $(-\sqrt{3}, 0)$
(C) $(-\sqrt{3}, 0) \cup (0, +\infty)$
(D) $(-\infty, -\sqrt{3}) \cup (0, \sqrt{3})$
(E) $(\sqrt{3}, +\infty)$



Graph of f'

12. The graph of f', the derivative of the function *f*, is shown above. Which of the following statements is true about *f*?

(A) f is decreasing for $-1 \le x \le 1$
(B) f is increasing for $-2 \le x \le 0$
(C) f is increasing for $-1 \le x \le 2$
(D) f has a local minimum at $x = 0$
(E) f is not differentiable at $x = -1$ and $x = 1$



13. The second derivative of the function f is given by $f''(x) = x(x-a)(x-b)^2$. The graph of f'' is shown above. For what values of x does the graph of f have a point of inflection?

(A) 0 and *a* only (B) 0 and *m* only (C) *b* and *j* only (D) 0, *a*, and *b* (E) *b*, *j*, and *k*

14. Over which interval(s) are the signs of both f' and f'' the same for $f(x) = 3x^4 - 4x^3 + 6$?

(A) $(0, \frac{2}{3})$
(B) $(-\infty, 0)$
(C) $(-\infty, 0) \cup (\frac{2}{3}, +\infty)$
(D) $(0, \frac{2}{3}) \cup (1, +\infty)$
(E) $(\frac{2}{3}, +\infty)$