

Skills: Expectations for a B: 5 EC, 2 or 3 CC.

- 1,2. Suppose that  $y' = 1 - 2x$  and that  $y(0) = -2$ . Using three equal-sized steps, approximate  $y(1)$  using Euler's method. Write the corresponding piecewise linear approximation to  $y$  and sketch its graph.
- 3,4. Create a sign chart for  $f'(x) = x^2(1 - x)$ . Sketch a graph of  $f$ .
5. Circle the appropriate answer (2 or 3 correct for EC):
  - TRUE FALSE  $y = \sec(x)$  has a stationary point at  $x = 0$ .
  - TRUE FALSE  $f(x) = -e^{-x}$  is increasing on its domain.
  - TRUE FALSE  $y = \cot(x)$  is concave down on  $(0, \pi/2)$ .
  - TRUE FALSE The domain of  $y = \log_3(1 - x) + 4$  is  $(1, \infty)$ .
6. Suppose that  $f''(x) = 3 - x^2$ .
  - (a) Where, if anywhere, is  $f$  concave up?
  - (b) Where, if anywhere, is  $f'$  increasing?
  - (c) What are the stationary points of  $f'$ , if any?
  - (d) What are the inflection points of  $f$ , if any?

Concepts: Expectations for a B: 1 EC.

7. Suppose that  $g(x) \leq -2$  on  $[-3, 0]$ , and that  $g(0) = 5$ . What can be said about  $g(-3)$ ? Your answer to this question should be written in paragraph form with complete sentences, with symbols used appropriately.
8. Create a function  $f$  defined on all real numbers with the following properties:
  - $f$  is concave down on  $(-\infty, 0)$ ;
  - $f$  is concave up on  $(0, \infty)$ ;
  - $f(x) \geq f'(x)$  for all real numbers  $x$ .

You do not need an explicit formula; a sketch is fine. Justify your answer appropriately.

9. Create a sign chart for  $f'(x) = \cos(x) \sin(2x)$ . Sketch a graph of  $f$ .