

## Answers to Math 124 Autumn 2021 Final

- $-\frac{1}{16}$
  - $\frac{1}{6}$
  - $f'(x) = -\frac{3}{(x-3)^2}$  (required computation with  $\lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$ )
- $f'(x) = \frac{(3x^2 - 2x)e^{3x-1} - (x^3 - x^2 + 1) \cdot e^{3x-1} \cdot 3}{(e^{3x-1})^2}$
  - $f'(x) = \frac{\cos(\ln x)}{x \cdot \sin(\ln x)}$
  - $y' = \left( \frac{\ln \sqrt{x}}{2\sqrt{x}} + \frac{1}{2\sqrt{x}} \right) \sqrt{x} \sqrt{x}$
- DNE
  - 3
  - $\infty$
  - $3/5$
  - 11, -8, -7, -5, 4, 8
  - (-11, -10), (-10, -8), (-5, 4)
  - (-10, -7), (2, 8)
  - 2
- 1.0125
  - $y'' > 0$ , it is concave up and increasing so LA gives an underestimate
- $\left( -\frac{249}{64}, \frac{65}{16} \right)$
- $\frac{d\theta}{dt} = -\frac{3 + 2\sqrt{2}}{10}$
- $2\pi\sqrt{3}$  cubic inches
- (0, 3) is the  $y$ -intercept. (1, 0) and (3, 0) are the  $x$ -intercepts.
  - There are no vertical asymptotes. The line  $y = 3$  is a horizontal asymptote in both the positive and negative directions.
  - $x = \sqrt{3}$  gives a local minimum.  $x = -\sqrt{3}$  gives a local maximum.
  - The inflection points are (-3, 6), (0, 3), and (3, 0). The graph is concave down on the intervals  $(-3, 0)$  and  $(3, \infty)$ .
  - Graph with labeled points:

