

Answers to Exam 3

1. (a) **FALSE**
(b) **FALSE**
(c) **TRUE**
(d) **FALSE**
(e) **FALSE**
2. (a) $y = x/3 + 1$
(b) 1.083333
3. 0.2565 cm/s
4. 3.26599×5.3333
5. (a) $y' = e^{2x-x^2}(2-2x)$
(b) $c = 1$ is the only critical point
(c) There is a local max at $x = 1$; increasing on $(-\infty, 1)$; decreasing on $(1, \infty)$.
(d) $y'' = e^{2x-x^2}(4x^2 - 8x + 2)$
(e) There are inflection points at $x = 1 + \sqrt{(2)}/2$ and $x = 1 - \sqrt{(2)}/2$; concave up on $(-\infty, 1 - \sqrt{(2)}/2) \cup (1 + \sqrt{(2)}/2, \infty)$; concave down on $(1 - \sqrt{(2)}/2, 1 + \sqrt{(2)}/2)$.
6. (a) $y' = \frac{1}{x^3 e^x}(x^3 e^x + 3x^2 e^x)$
(b)

$$\begin{aligned}y &= x^{\sin x} \\ \ln y &= \sin x \ln x \\ \frac{1}{y} \cdot y' &= \sin x \cdot \frac{1}{x} + \ln x \cdot \cos x \\ y' &= y \left(\frac{\sin x}{x} + \cos x \ln x \right) \\ y' &= x^{\sin x} \left(\frac{\sin x}{x} + \cos x \ln x \right)\end{aligned}$$

7. Does not pertain to our class.

- (a)
- (b)
- (c)