1. (a) No. One possible justification is: the plane through (2, 2, 2), (1, 0, 0), and (2, 3, 7) is
\[ 8x - 5y + z = 8 \] and \[ 8(5) - 5(5) + 5 \neq 8. \]
(b) \[ \frac{13}{90} (8, -5, 1) = \left( \frac{52}{45}, \frac{-13}{18}, \frac{13}{90} \right) \]

2. (a) \[ \mathbf{T}(t) = \left( \frac{2}{t + 2}, \frac{t}{t + 2}, \frac{2t^{1/2}}{t + 2} \right) \]
(b) \[ 2(x - 2) + (y - \frac{1}{2}) + 2(z - \frac{4}{3}) = 0 \]
(c) \[ \kappa(t) = \frac{1}{\sqrt{t(t + 2)^2}} \] and \( \lim_{t \to \infty} \kappa(t) = 0. \) The curve gets “straighter” as \( t \to \infty. \)

3. (a) i. point; ii. ellipse; iii. pair of lines; iv. hyperbola; v. pair of lines; vi. hyperbola.
(b) cone
(c) T, T

4. \( x + y + z = 3 \)

5. (a) \[ z = -3(x - 2) + 8(y - 2) - 6 \]
(b) \(-6.43\)

6. 18 inches by 18 inches by 36 inches

7. (a) \[ \frac{1}{3} \sin 1 \]
(b) \[ 2\pi \left[ \frac{1000 - 2(50)^{3/2}}{3} \right] \]

8. (a) \[ x^3 e^{x^2} = \sum_{k=0}^{\infty} \frac{x^{2k+3}}{k!} \] for all real \( x \)
(b) \( T_5(x) = x^3 + x^5 \)
(c) \[ g(x) = \sum_{k=0}^{\infty} \frac{x^{2k+4}}{(2k+4)k!} \] for all real \( x \)

9. (a) \[ T_2(x) = 2 + \frac{1}{12}(x - 8) - \frac{1}{288}(x - 8)^2 \]
(b) \[ |f(x) - T_2(x)| \leq \frac{10}{627.7874} \approx 0.0003443 \] (Larger bounds accepted.)
(c) \[ \sqrt{5} \approx \frac{599}{288} \approx 2.07986 \]