1) \[ f(x) = \frac{4}{\sqrt{x}} + 2\sqrt{x} = 4x^{-1/2} + 2x^{1/2} \]
2) \[ g'(t) = 5t^4e^{-t} - t^5e^{-t} = t^2e^{-t}(5-t). \]
   Horizontal tangents are where \( g'(t) = 0 \), so \( t = 5, 0 \).
3) \[ g'(t) = \frac{t^2 + 6t - 5}{(t+3)^2}. \]
4) \[ f''(x) = (6x - x^3 - 4) \sin x + 6x^2 \cos x. \]
5) \[ f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \left[ \frac{2(x+h) + (x+h)^3}{h} - \frac{2x + x^3}{h} \right] \]
   \[ = \lim_{h \to 0} \frac{2x + 2h + x^3 + 3x^2h + 3xh^2 + h^3 - 2x - x^3}{h} = \lim_{h \to 0} \frac{2h + 3x^2h + 3xh^2 + h^3}{h} \]
   \[ = \lim_{h \to 0} [2 + 3x^2 + 3xh + h^2] = 2 + 3x^2 \]

Power rule is \( \frac{d}{dx} x^k = kx^{k-1} \). \( \frac{d}{dx} (2x + x^3) = \frac{d}{dx} (2x) + \frac{d}{dx} (x^3) = 2 + 3x^2 \)
6) Since \( f(1) = 4 \), the point on the T.L. is \((1, 4)\). Since \( f'(x) = 2x + 2 + 3x^2 \) the slope of the T.L. is \( f'(1) = 7 \).
   So \( y - 4 = 7(x - 1) \) and so \( y = 7x - 3 \)
7) Graph the function \( f(x) = x^2 + 2x - 3 \) on the interval \([-4, 3]\) below indicating scales, labeling the vertex, and all intercepts, as well as end-points. The graph MUST fit in the grid below so choose your scaling carefully!

**Answer:**
Endpoints are in green \((-4, 5)\), and \((3, 12)\). \(x\)-intercepts are \((-3, 0)\), and \((1, 0)\). \(y\)-intercept is \((0, -3)\) in red, and vertex in blue is \((-1, -4)\).