Name: _____

Show your work. Answers without work earn reduced credit.

1. [**2 parts, 1 point each**] Let $C(q)$ represent the cost and $R(q)$ represent the revenue, in dollars, of producing q items.

   (a) If $C(50) = 2340$ and $C'(50) = 14$, estimate $C(52)$.

   (b) If $C'(50) = 20$ and $R'(50) = 26$, estimate the profit that the company earns from the 51^{st} item.

2. [**4 parts, 1 point each**] Differentiate the following functions.

   (a) $y = 5x^3$

   (b) $y = \dfrac{1}{t^4}$

   (c) $f(r) = \sqrt{r}(r+1)$

   (d) $y = x^{\ln 6} + \sqrt{\pi}$

3. [**1 point**] Find the equation of the tangent line to the curve $f(t) = t^2 - 3t + 1$ at $t = 2$.

4. [**3 parts, 1 point each**] Differentiate the following functions.

   (a) $f(x) = 2e^x + x^2$

   (b) $y = 2^t + e^{3x}$

   (c) $g(s) = 4 \cdot e^{0.5s} + \ln(s)$