

Quiz 13

Name: key*You must show your work to get full credit.*

1. Compute the following derivatives:

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

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

$$= 2x e^x + x^2 e^x$$

$$f'(x) = \frac{2x e^x + x^2 e^x}{}$$

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

(either is OK)

(b) $A = r \ln(r)$.

$$A' = r' \ln(r) + r \ln(r)'$$

$$= 1 \ln(r) + r \frac{1}{r}$$

$$= \ln(r) + 1$$

$$\frac{dA}{dr} = \ln(r) + 1$$

(c) $C = e^q \ln(q)$

$$\frac{dC}{dq} = (e^q)' \ln(q) + e^q (\ln(q))'$$

$$= e^q \ln(q) + e^q \frac{1}{q}$$

$$\frac{dC}{dq} = \frac{e^q \ln(q) + \frac{e^q}{q}}{}$$

$$= e^q \left(\ln(q) + \frac{1}{q} \right)$$

(either is fine)

(d) $P(t) = 500(1.06)^t$

$$P'(t) = 500 \ln(1.06) (1.06)^t$$

$$P'(t) = \underline{500 \ln(1.06) (1.06)^t}$$

(e) $y = x^n e^{ax}$ where n and a are constants.

$$y' = (x^n)' e^{ax} + x^n (e^{ax})'$$

$$= nx^{n-1} e^{ax} + x^n a e^{ax}$$

$$y' = \underline{nx^{n-1} e^{ax} + x^n a e^{ax}}$$

$$= (nx^{n-1} + ax^n) e^{ax}$$

(either is fine)