**Mathematics 122**

**Quiz #17** Name: Key

***You must show your work to get full credit.***

Let $a$ and $b$ be constants, then find the derivatives of the following:

(1) $f(x) = x^3 e^x$. $f'(x) =$ $3x^2e^x + x^3e^x$

1 pt

$f'(x) = (x^3)'e^x + x^3(e^x)'$

(2) $A = r^2 \ln(r)$. $\frac{dA}{dr} =$ $2r\ln(r) + r$

1 pt

$\frac{dA}{dr} = (r^2)'\ln(r) + r^2(\ln(r))'$

$= 2r\ln(r) + r^2\frac{1}{r}$

(3) $C(q) = x^3 e^{x^2+x}$. $C'(q) =$ _____

1 pt

$C'(q) = (x^3)'e^{x^2+x} + x^3(e^{x^2+x})'$

$= 3x^2 e^{x^3+x} + x^3 e^{x^2+x}(2x+1)$

(4) $y = x^5\sqrt{4x+7} = x^5(4x+7)^{\frac{1}{2}}$ $y' =$ _____

1 pt

$y' = (x^5)'(4x+7)^{\frac{1}{2}} + x^5((4x+7)^{\frac{1}{2}})'$

$= 5x^4(4x+7)^{\frac{1}{2}} + x^5(\frac{1}{2})(4x+7)^{-\frac{1}{2}}(4)$

(5) $w = z^a e^{bz^2}$. $\frac{dw}{dz} =$ _____

1 pt

$\frac{dw}{dz} = (z^a)'e^{bz^2} + z^a(e^{bz^2})'$

$= az^{a-1}e^{bz^2} + z^a e^{bz^2}(2bz)$