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5. Which of the following are correct calculations for difference quotient of: q(u) = 3 u^2 + 9 u + 9 q(u) = 3 u^2 + 9 u + 9 q(u+h) = 3 (h+u)^2 + 9 (h+u) + 9 = 3 h^2 + 6 h u + 9 h + 3 u^2 + 9 u + 9 q(u+h) = q(u) - (3 h^2 + 6 u h + 9 h + 3 u^2 + 9 u + 9) - (3 (u+1)^2 + 9 (u+1) + 9)
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\begin{array}{l} = 3 \ h + 6 \ u + 9 \\ \\ q \, (u) = 3 \ u^2 + 9 \ u + 9 \\ \\ q \, (u + h) = 3 \ (h + u)^2 + 9 \ (h + u) + 9 \\ \\ = 3 \ h^2 + 6 \ h \ u + 15 \ h + 3 \ u^2 + 15 \ u + 21 \\ \\ \frac{q \, (u + h) - q \, (u)}{h} = \frac{\left(3 \ h^2 + 6 \ u \ h + 15 \ h + 3 \ u^2 + 15 \ u + 21\right) - \left(3 \ u^2 + 9 \ u + 9\right)}{h} \\ \\ = \frac{3 \ h^2 + 6 \ u \ h + 9 \ h}{h} \\ \\ = \frac{h \, (3 \ h + 6 \ u + 9)}{h} \\ \\ = 3 \ h + 6 \ u + 9 \end{array}
```

_ <u>3 h²+6 u h+9 h</u>

_ <u>h (3 h+6 u+9)</u>

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\begin{split} q\left(u\right) &= 3\ u^2 + 9\ u + 9 \\ q\left(u + h\right) &= 3\ \left(h + u\right)^2 + 9\ \left(h + u\right) + 9 \\ &= 3\ h^2 + 6\ h\ u + 9\ h + 3\ u^2 + 9\ u + 9 \\ &\frac{q\left(u + h\right) - q\left(u\right)}{h} &= \frac{\left(3\ h^2 + 6\ u\ h + 9\ h + 3\ u^2 + 9\ u + 9\right) - \left(3\ u^2 + 9\ u + 9\right)}{h} \\ &= \frac{3\ h^2 + 6\ u\ h + 9\ h}{h} \\ &= \frac{h\left(3\ h + 6\ u + 9\right)}{h} \\ &= 3\ h + 6\ u + 9 \end{split}
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\begin{array}{l} q\left(u\right)=3\;u^{2}\,+\,9\;u\,+\,9\\ q\left(u\!+\!h\right)=3\;\left(h\,+\,u\right)^{\,2}\,+\,9\;\left(h\,+\,u\right)\,+\,9\\ =3\;h^{2}\,+\,6\;h\;u\,+\,3\;h\,+\,3\;u^{2}\,+\,3\;u\,+\,3\\ \frac{q\left(u\!+\!h\right)-q\left(u\right)}{h}=\frac{\left(3\;h^{2}\!+\!6\;u\;h\!+\!21\;h\!+\!3\;u^{2}\!+\!21\;u\!+\!39\right)-\left(3\;u^{2}\!+\!9\;u\!+\!9\right)}{h}\\ =\frac{3\;h^{2}\!+\!6\;u\;h\!+\!9\;h}{h}\\ =\frac{h\left(3\;h\!+\!6\;\left(u\!+\!1\right)\!+\!9\right)}{h}\\ =3\;h\,+\,6\;u\,+\,9 \end{array}
```

Solution