Differential Eqns MAP2302 **S-Class** Prof. JLF King Wedn., 03Feb2021

S: Show no work.

a 10 Multinomial coefficient $\binom{10}{3,1,6} =$ ⌞.....⌟.

b 10 10 Complex number $[x + \mathbf{i}y]^2 = -18\,\mathbf{i}$, for *real numbers* $x>y$, where $x=$ ⌞.....⌟ and $y=$ ⌞.....⌟.

c 10 10 10 10 U.F $y = y(t)$ satisfies $y'' + 3y' + 2y = 0$, with $y(0) = 2$ and $y'(0) = 11$. So $y(t) = Ae^{\alpha t} + Be^{\beta t}$, where $\alpha \geq \beta$. Thus
$\alpha=$ ⌞.....⌟, $\beta=$ ⌞.....⌟, $A=$ ⌞.....⌟, $B=$ ⌞.....⌟.

d 30 For $t>0$, fnc $y_\alpha(t) :=$ ⌞.....⌟ is the gen.soln to $y' + \left[\frac{3}{t} \cdot y\right] = t^6$. [*Hint:* FOLDE.]

e 20 DiffOperators $\mathbf{P}, \mathbf{Q}, \mathbf{R}, \mathbf{S}$ are defined by

$$\mathbf{P}(f) := f(4) \cdot f', \qquad \mathbf{Q}(f) := \cos(4) \cdot f^{(4)},$$
$$\mathbf{R}(f) := [\cos(4) \cdot f] + f'', \qquad \mathbf{S}(f) := \cos(4) + [4f'].$$

Then . . . **P** *is linear:* T F. **Q** *is linear:* T F.
R *is linear:* T F. **S** *is linear:* T F.

f 20 Degree-N polynomial $y = y(t)$ satisfies

†: $$4y^2 - t^9 y' = 15t^9 + 4t^2.$$

Thus $N =$ ⌞....⌟.
[*Hint:* Don't compute y; just a possible degree of the polynomial.]

g 10 *"I have neither requested nor received help on this exam other than from my professor."*

S: ___ ___ ___ 150pts

Total: ___ ___ ___ 150pts