

Naam/Name: _____

Stud. Nr: _____

Toegepaste Differensiaalvergelykings**TW244 Toets 2, 18 November 2021****Dosent/Lecturer:** Prof N Hale**Instruksies:**

- (a) 5 probleme (+2 bonus).
- (b) 50 + 6 bonus punte (50 maks).
- (c) 2.5 uur, toeboek.
- (d) Sakrekenaars word toegelaat. Selfone nie.
- (e) Toon alle bewerkings. 'n Korrekte antwoord verdien nie noodwendig volpunte sonder die nodige verduideliking nie.
- (f) Daar is leë bladsye aan die agterkant van die vraestel as jou antwoorde nie inpas in die gegewe spasies nie. Dui duidelik aan as jou antwoord voortgaan op een van hierdie bladsye. Jy mag hierdie bladsye verwyder as dit meer gerieflik is.
- (g) Die formules hieronder mag enige plek in die toets sonder bewys gebruik word.

Formules/Formulae:

- Integrasiefaktor/Integrating factor :
- Wronskiaan/Wronskian:
- Green se funksie/ :
Green's function
- Deelsgewyse integrasie/ :
Integration by parts
- Dubbelhoek formules/ :
Double angle formulae
- Laplace transform
- Gaussiese integraal/ :
Gaussian integral
- Klassifikasie van kritieke punte vir **lineêre** stelsels/
Classification of critical points for **linear** systems

Applied Differential Equations**TW244 Test 2, 18 November 2021****Moderator:** Prof JAC Weideman**Instructions:**

- (a) 5 problems (+2 bonus).
- (b) 50 + 6 bonus marks (50 max).
- (c) 2.5 hours, closed book.
- (d) Calculators are allowed. Cell phones are not.
- (e) Show all calculations. A correct answer may not earn full marks without the necessary explanation.
- (f) There are blank pages at the back of the paper in case you cannot fit your answer in the space provided. Indicate clearly if your answer continues to one of these pages. You may remove these pages if you find it more convenient.
- (g) The formulae below may be used without proof anywhere in the test.

$$y' + p(x)y = q(x) \rightarrow f(x) = e^{\int p(x) dx}$$

$$W(x) = \begin{vmatrix} y_1(x) & y_2(x) \\ y_1'(x) & y_2'(x) \end{vmatrix}$$

$$G(x, t) = \frac{y_1(t)y_2(x) - y_1(x)y_2(t)}{W(t)}$$

$$\int_a^b f g' dx = [fg]_a^b - \int_a^b f' g dx$$

$$\cos(a \pm b) = \cos(a) \cos(b) \mp \sin(a) \sin(b)$$

$$\sin(a \pm b) = \sin(a) \cos(b) \pm \cos(a) \sin(b)$$

$$\mathcal{L}\{f(t)\} = \int_0^\infty e^{-st} f(t) dt$$

$$\int_0^\infty e^{-t^2} dt = \frac{1}{2} \sqrt{\pi}$$

