Calculus ABC Test II—Version 3005 Name: Key

Lecture section: ____________ **Student Number:** ____________

PUT ANSWERS IN BOXES. NO BOOKS/NOTES/CALCULATORS. DO YOUR OWN WORK. Simplify answers where possible. Include units where needed. All angles are in radians. $\log = \log_{10}$.

1. Find the equation of the line through the point (-1,2) with slope $-\frac{1}{3}$ in *slope-intercept* form.

$\boxed{y = -\frac{1}{3}x + \frac{5}{3}}$

$y - y_o = m(x - x_o) \Rightarrow y - 2 = -\frac{1}{3}(x - (-1))$

$y - 2 = -\frac{1}{3}(x+1) \Rightarrow y - 2 = -\frac{1}{3}x - \frac{1}{3}$

$y = -\frac{1}{3}x - \frac{1}{3} + 2$

$y = -\frac{1}{3}x - \frac{5}{3}$

2. Find the value of:

$$\arccos\left(\frac{\sqrt{2}}{2}\right)$$

$\boxed{\frac{\pi}{4}}$

3. Solve for x:

$$x + \frac{9}{x} = 6$$

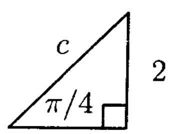
$\boxed{x = 3}$

4. Rewrite by completing the square: $2x^2 + 8x - 1$

$2(x^2 + 4x) - 1$

$\boxed{2((x+2)^2) - 9}$

5. Find the value of c:



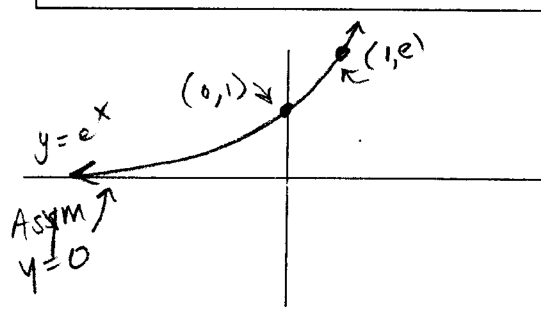
$\boxed{2\sqrt{2}}$

6. Solve for x:

$$\ln(x) = 5$$

$\boxed{e^5}$

7. Graph the function $y = e^x$.
Label with the following values (if applicable): each intercept, location of each asymptote, and (x, y) coordinates of each min and max. Also include the coordinates of one other point.



8. Solve for x:

$$\log(x) = -3$$

10^{-3}

$\boxed{\frac{1}{1000}}$

9. If $f(s) = 2s^4 + 7s^3 - 4s + 2$, find $f'(s)$.

$\boxed{8s^3 + 21s^2 - 4}$

$(2-x)(2-x)(2-x)(2-x)$

$(4-4x+x^2)(4-4x+x^2)$

$\cancel{16}-\cancel{16x}+4x^2-\cancel{16x}+\cancel{16x^2}-4x^3+\cancel{4x^2}-4x^3+x^4$

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$=\int 16-32x+24x^2-8x^3+x^4$

$\frac{16x}{} - \frac{32x^2}{2} + \frac{24x^3}{3} - \frac{8x^4}{4} + \frac{x^5}{5}$

$= 16x - 16x^2 + 8x^3 + 2x^4 + \frac{1}{5}x$

10. If $y = \sqrt{x}$, find dy/dx.

$y = x^{\frac{1}{2}} \quad \frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}}$

$\boxed{\frac{1}{2}x^{-\frac{1}{2}}}$

11. If $f(\theta) = \sin(\theta^2 - \theta)$, find $f'(\theta)$.

$\boxed{\cos(\theta^2-\theta)(2\theta-1)}$

12. If $f(t) = \tan(t^2 + 1)$, find $f'(t)$.

$\boxed{\sec^2(t^2+1)\cdot 2t}$

13. Find the derivative of

$$f(x) = \cos(x)\ln(x)$$

$\boxed{\cos(x)\cdot\frac{1}{x} - \sin(x)\ln(x)}$

14. Find the derivative of

$$g(x) = \frac{e^x + 1}{e^x - 1}$$

$\frac{-2e^x}{(e^x-1)^2}$

$\boxed{\frac{(e^x-1)(e^x)-(e^x+1)(e^x)}{(e^x-1)^2}}$

15. Find the derivative of

$$f(x) = \frac{\sin(x)}{\sqrt{x}}$$

$\boxed{\frac{\sqrt{x}(\cos(x)) - \sin(x)\frac{1}{2}x^{-\frac{1}{2}}}{x}}$

$\frac{x\cos x -}{x^{3/2}}$

16. Find a function $f(t)$ whose derivative is:

$$f'(t) = 3 - 2\sqrt{t}$$

$\boxed{3t - 2\left(\frac{2}{3}t^{3/2}\right)}$

17. Evaluate the indefinite integral:

$u = 2-x$
$du = -1\,dx$
$-du = dx$

$$\int (2-x)^4\,dx$$

$\int u^4 \, -du = -\int u^4\,du = -\left(\frac{u^5}{5}\right) + C$

$\boxed{-\frac{(2-x)^5}{5} + C}$

18. Evaluate the indefinite integral:

let $u = -x^4$
$du = -4x^3\,dx$
$\frac{du}{-4} = x^3\,dx$

$$\int x^3 e^{-x^4}\,dx$$

$= \int e^u \frac{1}{-4}\,du = -\frac{1}{4}\int e^u\,du$

$= -\frac{1}{4}e^u + C$

$-\frac{1}{4}e^{-x^4} + C$

$\boxed{-\frac{1}{4}e^{-x^4} + C}$

19. Evaluate the definite integral:

$$\int_0^2 (3x^2 - 2x)\,dx$$

$x^3 - x^2 \Big]_0^2$

$(2^3-2^2) - (0) = 8-2 = 6$

$\boxed{4}$

20. Evaluate the definite integral:

$$\int_0^1 e^{-x}\,dx$$

$-e^{-x}\Big]_0^1 = -e^{-1} + e^0 = -\frac{1}{e} + 1$

$\boxed{-\frac{1}{e} + 1}$